Post-MDD: Analysis of Alternatives (AoA)

Defense Acquisition University

Foundational Learning

Workflow Learning

Performance Learning

Lesson Objectives

- Explain how the Analysis of Alternatives (AoA) supports DoD's three decision support systems
  - Explain statute and policy
  - Recognize the perspective what an ideal AoA provides
  - Recognize some Best Practices
  - Describe an AoA Study Team

Statutes and Policies

- Sections 2366a and 2366b of Title 10, USC
  - NDAA 2006
- Weapons Systems Acquisition Reform Act of 2009
  - Public Law 111-23 May 22, 2009 NDAA FY09
- Director of Cost Assessment and Program Evaluation
  - DoDD 5105.84 May 11, 2012 DA&M
- Operation of the Defense Acquisition System
  - Interim DoDI 5000.02 January 7, 2015 USD(AT&L)
- Joint Capabilities Integration and Development System

2366a and 2366b Certification

- § 2366a. Major defense acquisition programs: certification required before Milestone A

  (a) Certification—A major defense acquisition program may not receive Milestone A approval…. or otherwise be initiated prior to Milestone B approval…until the Milestone Decision Authority certifies…

  (4) that an analysis of alternatives has been performed consistent with study guidance developed by the Director of Cost Assessment and Program Evaluation;

- § 2366b. Major defense acquisition programs: certification required before Milestone B

  (a) Certification—A major defense acquisition program may not receive Milestone B approval…, until the milestone decision authority—

  (1) has received a business case analysis and certifies on the basis of the analysis that—

  (A) the program is affordable when considering the ability of the Department of Defense to accomplish the program's mission using alternative systems;

A major defense acquisition program must have an AoA*

*Excludes current ops rapid acquisitions / MS C and beyond (Also includes MAIS programs)

Example documents for 2366b Business Case Analysis

- ARA memo
- AoA
- ORD
- CDD
- ASR
- SCP
- ICE
- MNS

- PB
- TRA report and memo
- PDR report
- CDD JROCM
- Class Justification & Approval
- Service Full Funding Memos

ARA: Acquisition Resources & Analysis
ORD: Operational Requirements Document
ASR: Acquisition Strategy Report
ICE: Independent Cost Estimate

SCP: Service Cost Position
PB: President's Budget
TRA: Technology Readiness Assessment
MNS: Mission Need Statement

WASRA

“Responsibilities.—

- The Director of Cost Assessment and Program Evaluation shall serve as the principal official within the senior management of the Department of Defense for the following: …

  (4) Formulation of study guidance for analyses of alternatives for major defense acquisition programs and performance of such analyses, as directed by the Secretary of Defense”[1]

“Study Guidance for Analysis of Alternatives.—

- The Director of Cost Assessment and Program Evaluation shall take the lead in the development of study guidance for an analysis of alternatives for each joint military requirement for which the Chairman of the Joint Requirements Oversight Council is the validation authority.
- In developing the guidance, the Director shall solicit the advice of appropriate officials within the Department of Defense and ensure that the guidance requires, at a minimum—

  (1) full consideration of possible trade-offs among cost, schedule, and performance objectives for each alternative considered; and

  (2) an assessment of whether or not the joint military requirement can be met in a manner

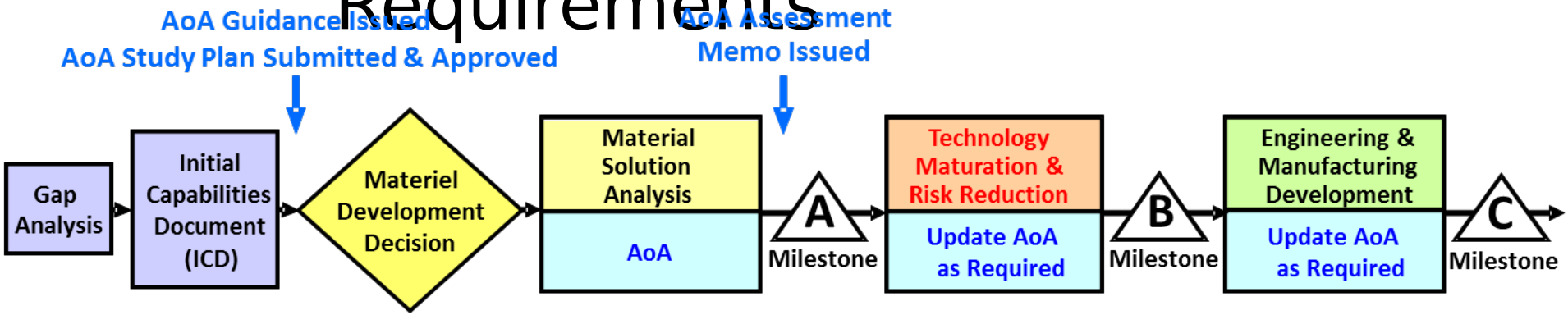
1. Para (a), section 101, Title I, Public Law 111-23; 2. ibid., para (d), section 201, Title II

DoDD 5105.84 Policy Requirements

- DCAPE is the principal authority to guide and assess AoAs
- DCAPE ensures that AoAs consider trade-offs among effectiveness, suitability, and life-cycle costs (or total ownership costs, if applicable) of alternatives that satisfy established capability needs among a comprehensive set of potential material solutions
- DCAPE shall:
  - a) Develop AoA Study guidance for MDAPs and MAIS programs.
  - b) Approve AoA Study plans for each MDAP and MAIS program.
  - c) Evaluate the adequacy of each AoA. Upon completion of an AoA, the DCAPE shall provide the Head of the DoD Component or PSA and to the Milestone Decision Authority an assessment of the AoA, to include a determination on whether the analysis is consistent with the AoA guidance.

Note: The text above is a list of direct extracts from DoDD 5105.84 dated May 11, 2012.

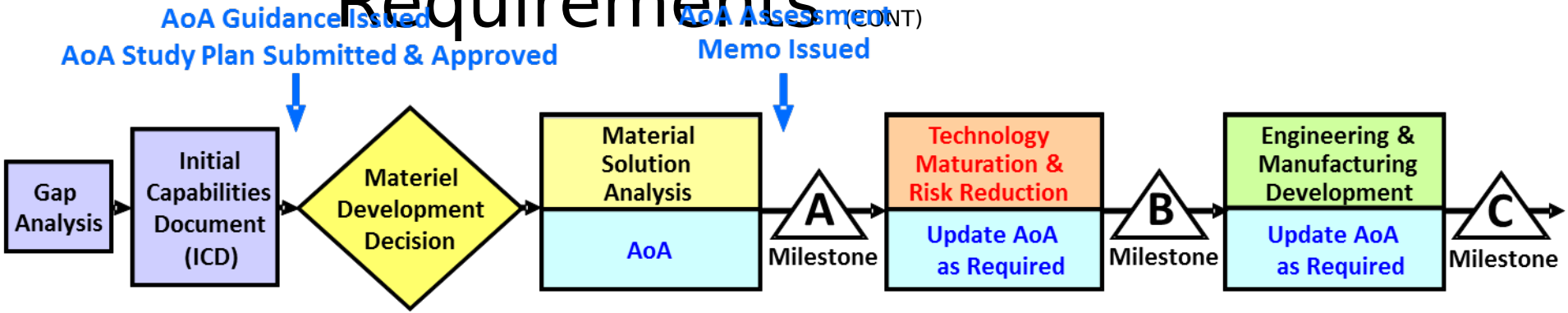
DoDI 5000.02 Policy Requirements



- The validated ICD and the AoA Study Plan will guide the AoA and Materiel Solution Analysis Phase activity
- The AoA will inform and be informed by affordability analysis, cost analysis, sustainment considerations, early systems engineering analysis, threat projections, and market research
- In developing the guidance, the DCAPE solicits the advice of other DoD officials and ensures that the guidance requires, at a minimum:
  1) Full consideration of possible tradeoffs among life-cycle cost, schedule, and performance objectives (including mandatory key performance parameters) for each alternative considered
  2) An assessment of whether the joint military requirement can be met in a manner consistent with the cost and schedule objectives recommended by the JROC or other requirements validation authority
  3) Consideration of affordability analysis results and affordability goals if established by the MDA

Note: The text above is a list of direct extracts from Interim DoDI 5000.02 dated November 25, 2013. Greater detail is provided in Enclosure 9 of that document.

DoDI 5000.02 Policy Requirements (CONT)



- The study plan will be coordinated with the MDA and approved by the DCAPE prior to the Materiel Development Decision.
- The final AoA shall be provided to the DCAPE not later than 60 calendar days prior to the Milestone A review (or the next decision point or milestone as designated by the MDA)
- Not later than 15 business days prior to the Milestone A review, DCAPE evaluates the AoA and provides a memorandum to the MDA, with copies to the head of the DoD Component or other organization or principal staff assistant assessing whether the analysis was completed consistent with DCAPE study guidance and the DCAPE-approved study plan.
- The final AoA will also be provided to and reviewed by the requirements validation authority prior to the Milestone A decisions or release of the request for proposals of the Technology Maturation and Risk Reduction Phase activities.

Note: The text above is a list of direct extracts from Interim DoDI 5000.02 dated November 25, 2013. Greater detail is provided in Enclosure 9 of that document.

What Does and Ideal AoA Provide?

- An ideal AoA provides essential information on the decision space available to make executive decisions
  - Prioritized, quantified, contextualized capability gaps
  - Feasible alternatives that are affordable and mitigate the capability gaps
  - The trades within and across alternatives among cost, schedule, and performance
  - Transparent analysis of recognized quality
  - Sensitivity analysis—how robust are the solutions?

AoA provides well-described and understood "options" for the decision-maker

AoA Best Practices

Stand-up a Service Executive Steering Body

Good Practice: Service Executive Steering Body is formed and includes key stakeholders (e.g. requirements, acquisition, resources)

Result:

- Ensures balanced approach needed for success
- Stakeholder integration throughout process mitigates risk of “stovepiped” analysis and solutions
- Provides a link to the CAPE-led “Study Advisory Group” which monitors execution of the AoA

Poor Practice: Service Executive Steering Body not formed

Result:

- Service more likely to proceed down path unaware of issues that may delay or kill effort

AoA Best Practices (CONT)

Cost and affordability considered upfront

Good Practice: Cost and affordability boundaries established early in the analysis

Result:

- Facilitates exploration of viable trade space
- Analytical resources not expended on infeasible solutions
- Includes O&S
- Includes impact on schedule—how long to build within cost limits

Poor Practice: Cost and affordability not considered or not addressed until end of AoA

Result:

- Exploration of viable trade space may be minimized or not accomplished
- Key aspects of viable trade space may be missed because analytical resources are applied toward exploring infeasible solutions

Screen out infeasible candidates early in the effort

AoA Best Practices (CONT)

Transparent Analysis

Good Practice: Site visits to centers of analysis and open analyst interaction

Result:

- Facilitates understanding of analysis enabling leadership to focus on the implication of results
- Fosters sound analysis which “co-opts” CAPE and AT&L
- Service can address OSD concerns before study time and effort invested

Poor Practice: No or limited analyst interaction

Result:

- Understanding of analysis impeded
- Confidence in analysis diminished
- Leadership time diverted to analyst reviews
- Re-work more likely

Recent site visits to Army Materiel Systems Analysis Activity proved useful in understanding methodology of on-going AoAs

AoA Best Practices (CONT)

Obtaining information from contractors / allies

Good Practice: Use request for information (RFI)

Result:

- Facilitates discussion of trade space to inform AoA
- Faster access to information
- May provide data as input to modeling and simulation

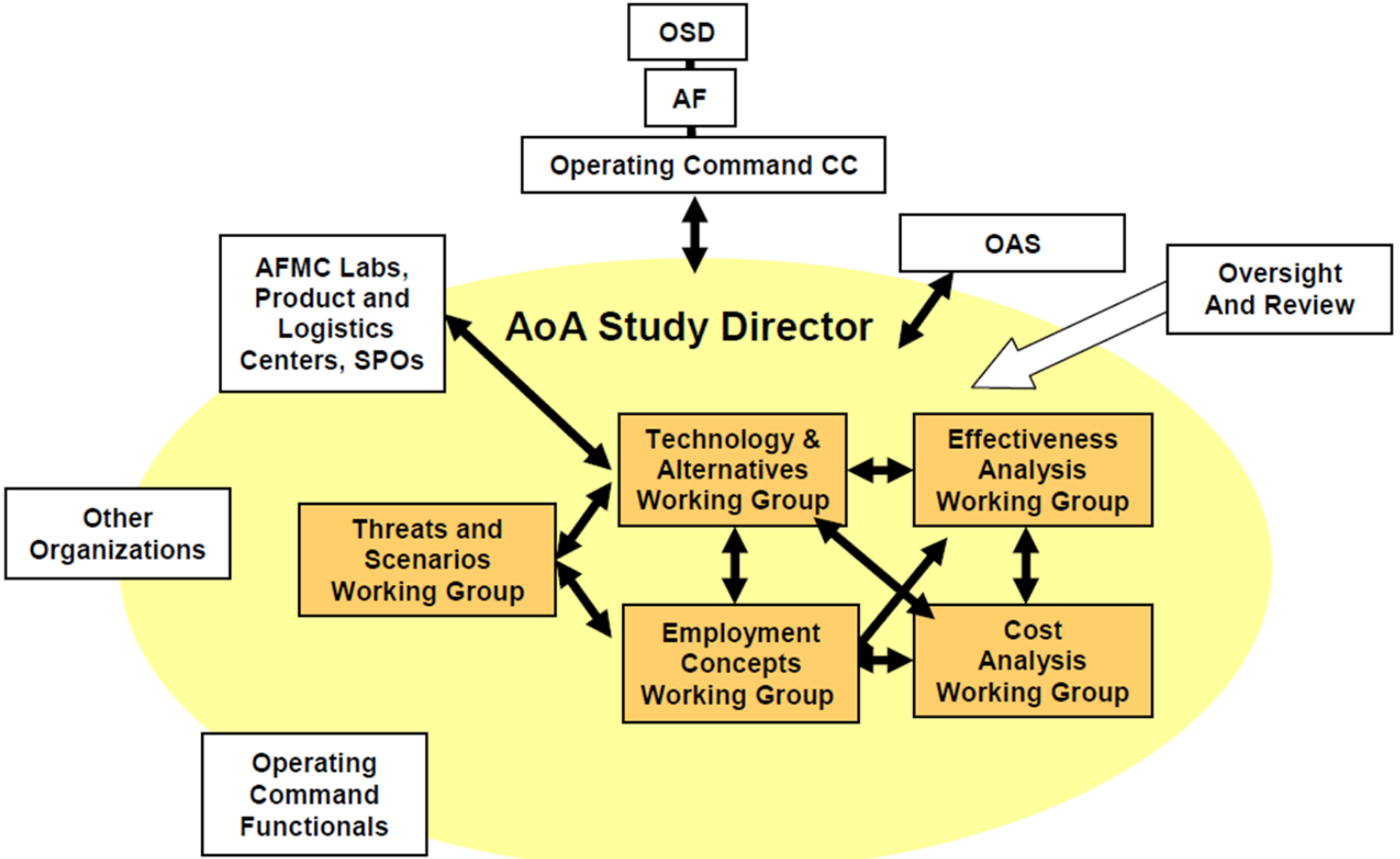
Poor Practice: Use request for proposal (RFP)

Result:

- May prejudge AoA
- Encumbers process with open competition constraints

Use of contractor information is legal and desirable but must be well-protected to avoid compromise that puts SESB at risk

AoA Study Team Structure



Office of Aerospace Studies: http://www.prim.osd.mil/Documents/AoA_Handbook.pdf

References

1. OMB Circular A-94: Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs: http://www.whitehouse.gov/omb/circulars_a094/
2. DoD Instruction 7041.3, "Economic Analysis for Decision-making: http://www.dtic.mil/whs/directives/corres/pdf/704103p.pdf
3. DoD Product Support BCA Guidebook: http://www.acq.osd.mil/log/mr/library/BCA_Guidebook_April2011.pdf
4. DA Economic Analysis Manual: https://www.cape.osd.mil/CostGuidance/Docs/ArmyCEAC_econ_analysisManual.pdf
5. DA Cost Analysis Manual: https://www.cape.osd.mil/CostGuidance/Docs/cam.pdf
6. US Army Cost-Benefit Analysis Guide: https://www.cape.osd.mil/CostGuidance/Docs/US%20Army%20CBA%20Guide%20V1%2020100112.pdf
7. US Army Cost-Benefit Analysis Portal (must request access): https://cpp.army.mil/portal/page/portal/Cost_Performance_Portal/CPP_Main_Page/CBA_Portal/
8. DON Enterprise IT BCA Template: http://www.doncio.navy.mil/ContentView.aspx?ID=2210
   DON Enterprise IT Abbreviated BCA Template: http://www.doncio.navy.mil/ContentView.aspx?id=4056
9. DON PBL BCA Guidebook: https://acc.dau.mil/adl/en-S/46528/file/13829/DON%20PBL%20BCA%20GUIDE%201NOV05.doc
10. AFI 65-501 (Economic Analysis): https://www.cape.osd.mil/CostGuidance/Docs/AFI65-501.pdf
11. AFI 65-509 (Business Case Analysis): https://www.cape.osd.mil/CostGuidance/Docs/AFI65-509.pdf
12. AFM 65-506 (Economic Analysis): https://www.cape.osd.mil/CostGuidance/Docs/AFMAN65-506.pdf
13. AFM 65-510 (BCA Procedures): https://www.cape.osd.mil/CostGuidance/Docs/AFMAN65-510.pdf
14. DAU CLL 040 BCA Tools: http://icatalog.dau.mil/onlinecatalog/courses.aspx?crs_id=1948
15. DAU CLL 015 Product Support BCA: http://icatalog.dau.mil/onlinecatalog/courses.aspx?crs_id=244
16. DAU CLR 151 Analysis of Alternatives: http://icatalog.dau.mil/onlinecatalog/courses.aspx?crs_id=1889

RQM 310
MDD to Milestone A

Defense Acquisition University

Foundational Learning Workflow Learning Performance Learning

Presenter: Tom Fritz

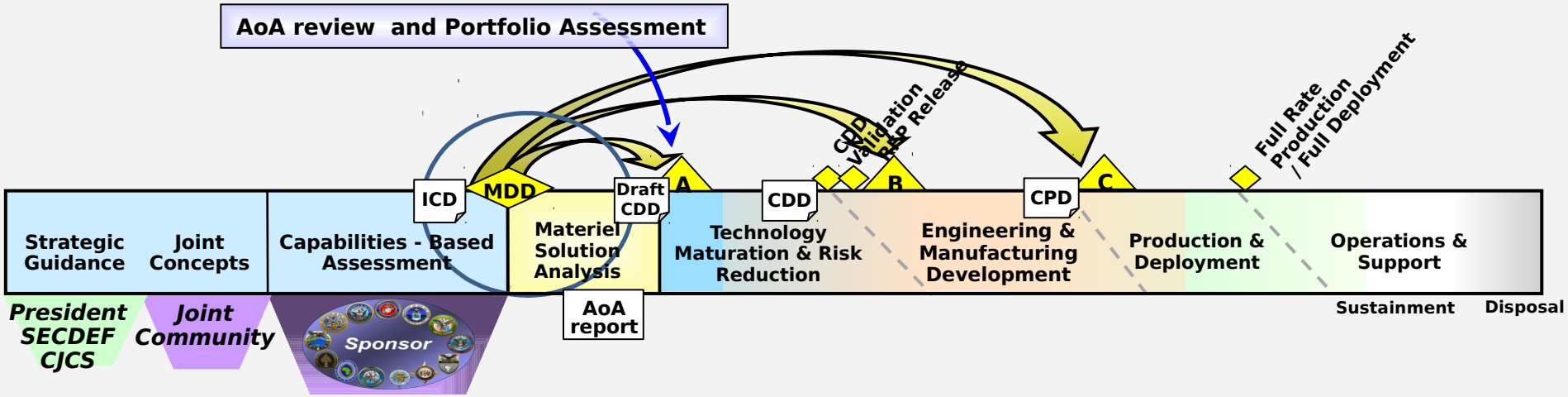
June 9, 2014

Lesson Objectives

Determine the key requirements management activities and the role of the ICD in support of the Materiel Development Decision (MDD), during the Materiel Solution Analysis (MSA) phase, and Milestone A.

- Explain the inputs to the MDD
- Explain the outputs from MDD -- decisions and approvals
- Summarize the purpose and major activities that take place during the MSA phase and the links between those activities
- Explain the Milestone A decisions and approvals

Materiel Development Decision (MDD)



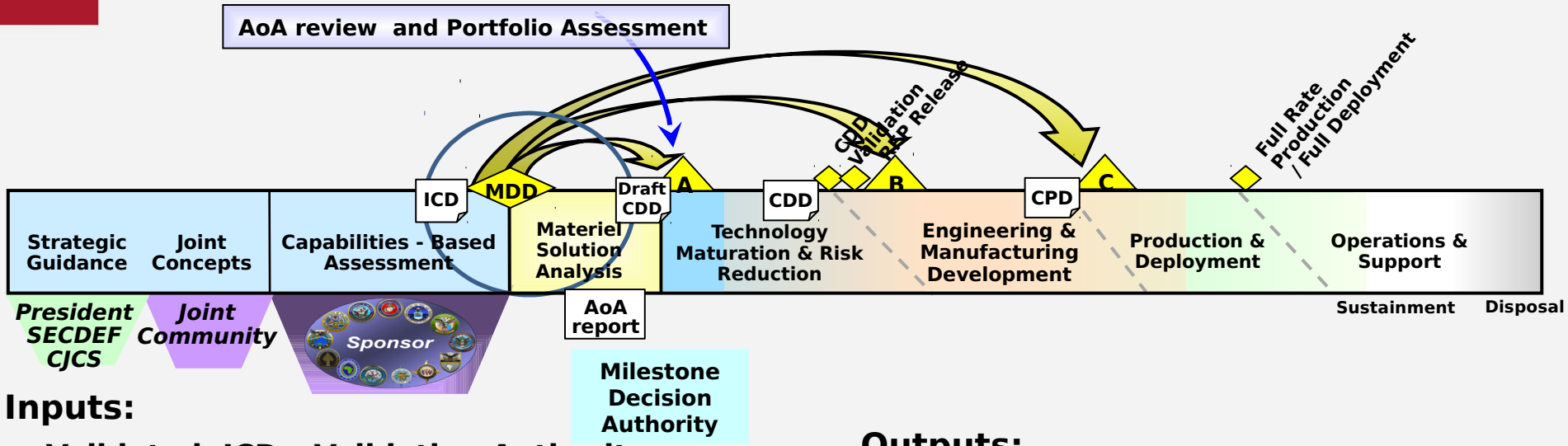
MDD is mandatory for all programs including Defense Business Systems

- **For DAB oversight programs (ACAT ID & ACAT IAM)**
  - **DCAPE presents the AoA Study Guidance**
  - **AoA lead organization presents DCAPE approved AoA Study Plan**
  - **Component provides the plan to staff and fund follow-on actions**
- **Components use similar process for Component-level programs (ACATs IC, IAC, II, III and IV)**

Quick Review: Pre-MDD Activities

- **ICD validated**
- **ICD recommends type of materiel approach(es) preferred**
- **Analysis of Alternatives (AoA)**
  - **AoA Study Guidance & AoA Study Plan approved prior to MDD**
  - **Sponsor works with Director, Cost Assessment and Program Evaluation (DCAPE) on AoA Study Guidance & AoA Study Plan (JROC Interest programs only – Component process for others)**
- **Sponsor works with MDA's staff to ensure other additional information is there to enable the desired MDD outcomes for entry into the acquisition process – Determines next phase and overall acquisition Model.**

Materiel Development Decision (MDD) Inputs and Outputs



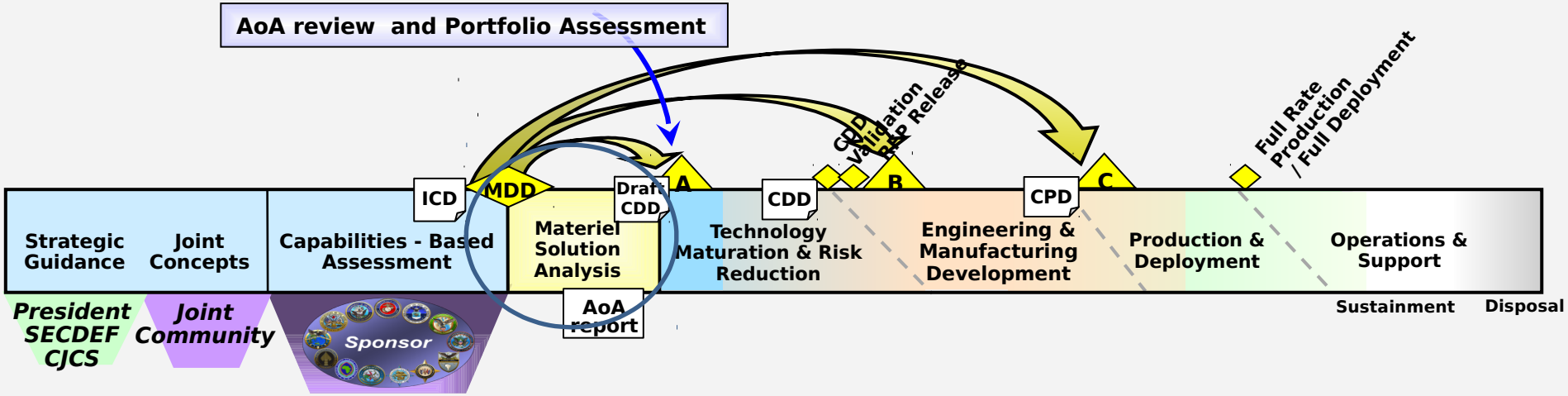
Inputs:

- Validated ICD – Validation Authority
- Initial Threat Environment Assessment (I, IA)
- Approved AoA Study Guidance - DCAPE
- Approved AoA Study Plan – AoA Lead Org
- Additional Analysis supporting preliminary conclusions to narrow range of alternatives – DoD Component
- Affordability Analysis: Tentative affordability cost goals and inventory goals to scope AoA

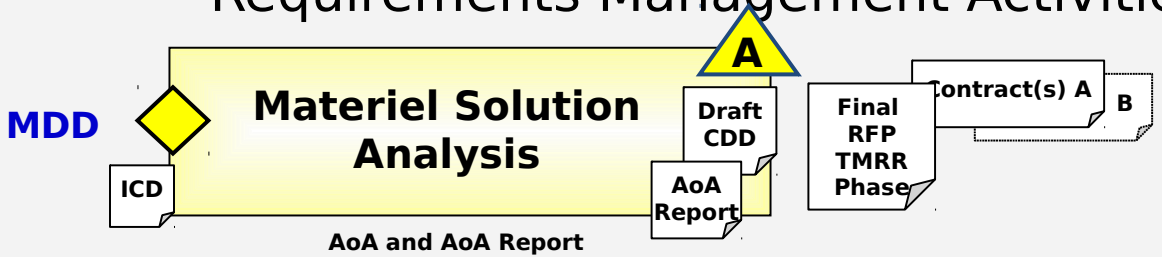
Outputs:

- Entry into the acquisition process
- MDA's Acquisition Decision Memorandum
  - Designates lead DoD Component
  - Determines the acquisition phase of entry
  - Identifies initial review milestone
  - Approved AoA Study Guidance and Study Plan (attached)

MDD to Milestone A
-- Entry at Materiel Solution Analysis



Materiel Solution Analysis
Requirements Management Activities



Purpose: **Conduct analysis and other activities to support a decision on needed product**

- **PM appointed; program office established**
- **Capability gaps translated into system specific requirements (KPP and KSA)**
- **AoA conducted**
- **Acquisition strategy (AS), TEMP and other milestone documents prepared**

Requirements Management Activities

- **Develop: CONOPS update, Operational Mode Summary/Mission Profile (OMS/MP) and *Draft CDD* – not submitted to JCIDS**
- **Help ensure AoA reflects solutions to satisfy the validated ICD**
  - **Support conduct of AoA (AoA report briefing for FCB)**
  - **Support writing of: AS, TEMP, SEP, RAM-C Report, Cybersecurity Strategy**
  - **Support initial estimates for: Affordability Goals and Life Cycle Cost**

Reliability Analysis
Planning, Tracking, and Reporting

- **PM formulates a comprehensive R&M program to ensure reliability and maintainability requirements are achieved.**
- **PM prepares a Reliability, Availability, Maintainability and Cost (RAM-C) Report in support of Milestone A**
  - **Attached to the Systems Engineering Plan (SEP), updated in support of the Development RFP Release Decision Point, Milestone B, and Milestone C**
  - **Reliability growth curves included in SEP at MS A, updated in the TEMP beginning at MS B.**
  - **Programs other than JROC Interest develop RAM-C Reports as determined by DoD Component or PM**
- **Current practice? Is RAM-C Report Executive Summary being attached to (or Referenced in) CDD & CPD?**

See, DoD Reliability, Availability, Maintainability, and Cost Rationale Report Manual, June 1, 2009 and Encl. 3, interim DoDI 5000.02

Milestone A

Component Presents

- **Acquisition Strategy (AS), business approach, risk assessment, and "should cost management" targets**
- **Affordability analysis and proposed affordability goals**
  - **Quantitative assessment within the prospective portfolio – unit production and sustainment cost**
- **Component Cost Estimate (CCE)**
- **Evidence of Full funding in FYDP**

MDA approves materiel solution; signs ADM approving:

- **Acquisition Strategy**
- **Release of RFP and source selection for TMRR phase contract**
- **Exit criteria required to complete TMRR and enter EMD**

Additional MDA activity – Title 10, Section 2366a Certification

A favorable Milestone A decision does not mean a new acquisition program has been initiated; except that ship programs may be initiated at Milestone A.

2366a Certification at MS A

PM interest areas are in blue bold

MEMORANDUM FOR THE RECORD

SUBJECT: Milestone A Program Certification

As required by Section 2366a of Title 10, United States Code, I have consulted with the Joint Requirements Oversight Council (JROC) on matters related to program requirements and military needs for the *(name of program)* and certify that:

(1) the program fulfills an approved initial capabilities document;

(2) the program is being executed by an entity with a relevant core function as identified by the Secretary of Defense;

(3) a determination of applicability of core depot-level maintenance and repair capabilities requirements has been made;

(4) **an analysis of alternatives has been performed consistent with the study guidance developed by the Director of Cost Assessment and Program Evaluation (DCAPE);**

(**5)** **a cost estimate for the program has been submitted, with the concurrence of the DCAPE, and the level of resources required to develop, procure, and sustain the program is consistent with the priority level assigned by the JROC**; and

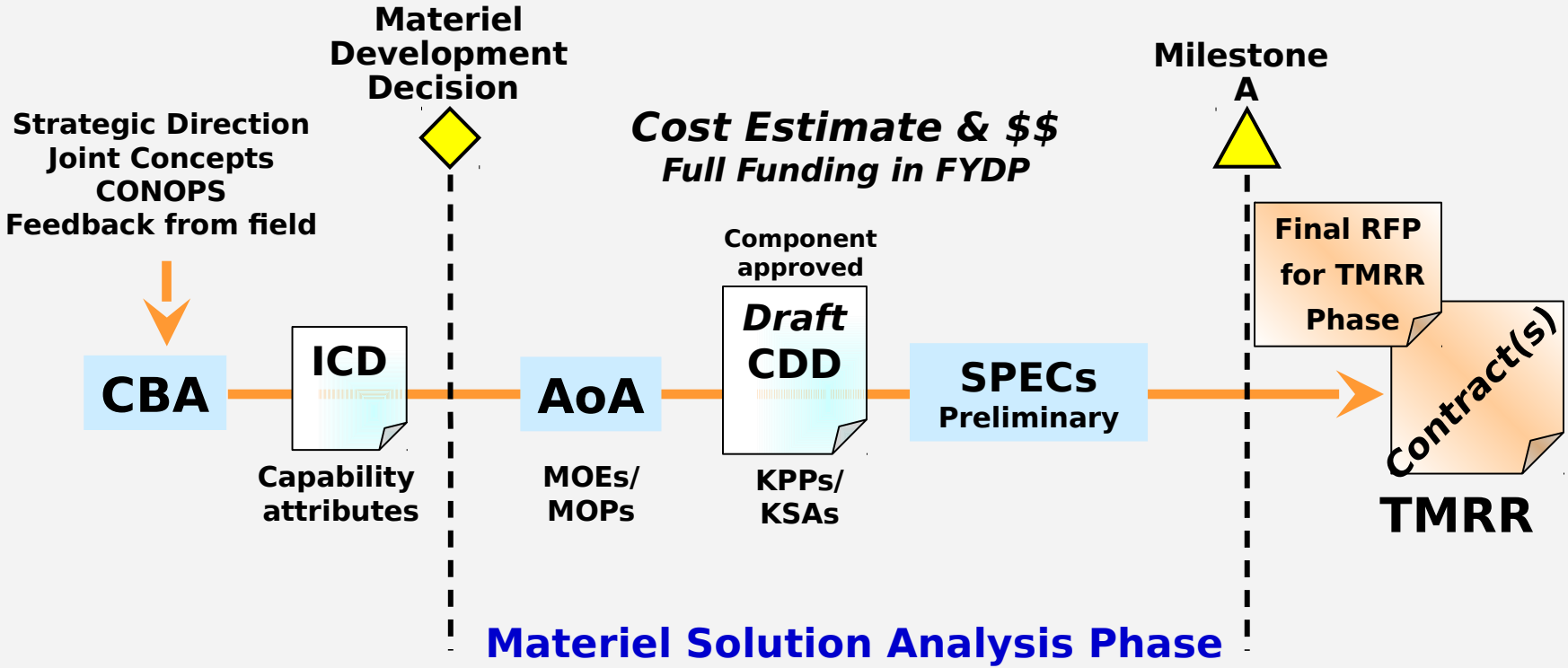
(6) *[only include if the system duplicates a capability already provided by an existing system]* **the duplication provided by this system and *(name of existing system)* program is necessary and appropriate.**

2366a Certification Notification

2366a certification is not submitted to Congress; however,

- If the projected cost of the program or subprogram, at any time prior to MB B approval, exceeds the cost estimate submitted at the time of certification by at least 25 percent, or the PM determines the time required to achieve initial operational capability is likely to exceed the schedule objective by more than 25 percent, the PM must notify the MDA.
- The MDA, in consultation with the JROC, shall determine whether the level of resources required to develop and procure the program remains consistent with the priority level assigned by the JROC.
- The MDA may withdraw the certification concerned or rescind MS A approval if the MDA determines that such action is in the interest of national defense.

Linkage: ICD, AoA, draft CDD, & Contract(s) for TMRR Phase



Program	DAB	DRM	OIPT	DPM	MS	Remarks
13-17 Jul 2015						
Joint Air-to-Ground Missile (JAGM)	15-Jul				MS B	
20-24 Jul 2015						
F-15 Eagle Passive/Active Warning Survivability System (EPAWSS)	24-Jul	17-Jul			MS A / EMD RFP Rel	
27-31 Jul 2015						
DAES Review	28-Jul					
03-07 Aug 2015						
Family of Advanced Beyond Line-of-Sight Terminals (FAB-T)	3-Aug	23-Jul			MS C	
10-14 Aug 2015						
17-21 Aug 2015						
Joint Precision Approach & Landing System (JPALS)	19-Aug	4-Aug	9-Jul		Dev RFP Rel	
Defense Enterprise Accounting Management System (DEAMS)	20-Aug	6-Aug	23-Jul	14-Jul	FDD	Possible Paper DPM
24-28 Aug 2015						
Joint Light Tactical Vehicle (JLTV)	25-Aug	14-Jul			MS C	

www.DAU.mil

Defense Acquisition University

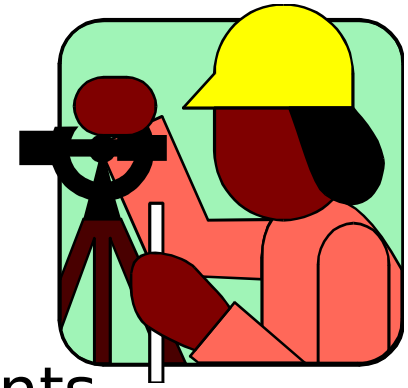
Foundational Learning Workflow Learning Performance Learning

Planning, Programming, Budgeting and Execution (PPBE) Process and Related Topics

Roberta Tomasini
Defense Systems Management College
Defense Acquisition University
703-805-3764
roberta.tomasini@dau.mil

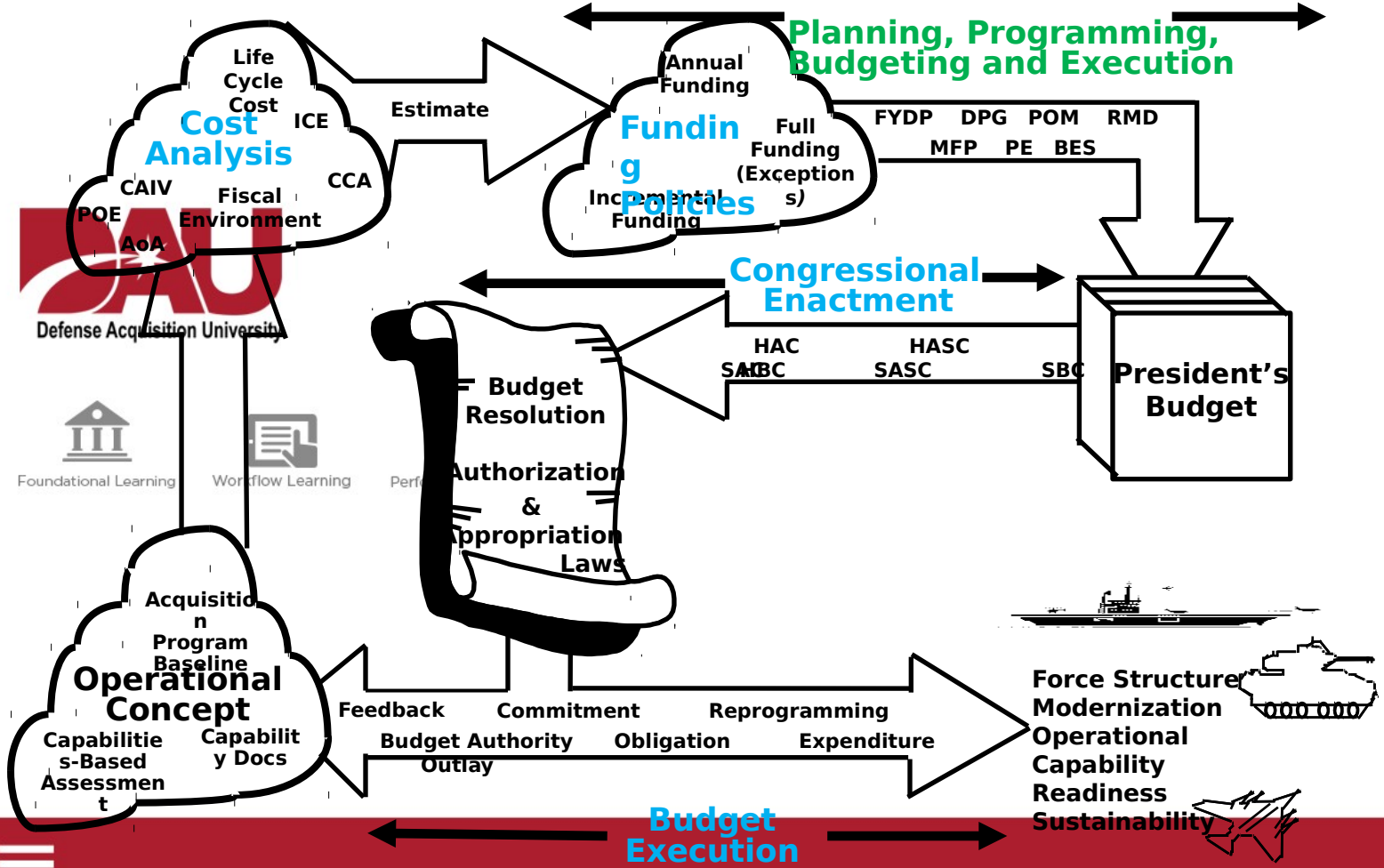
July 2015

PPBE Outline

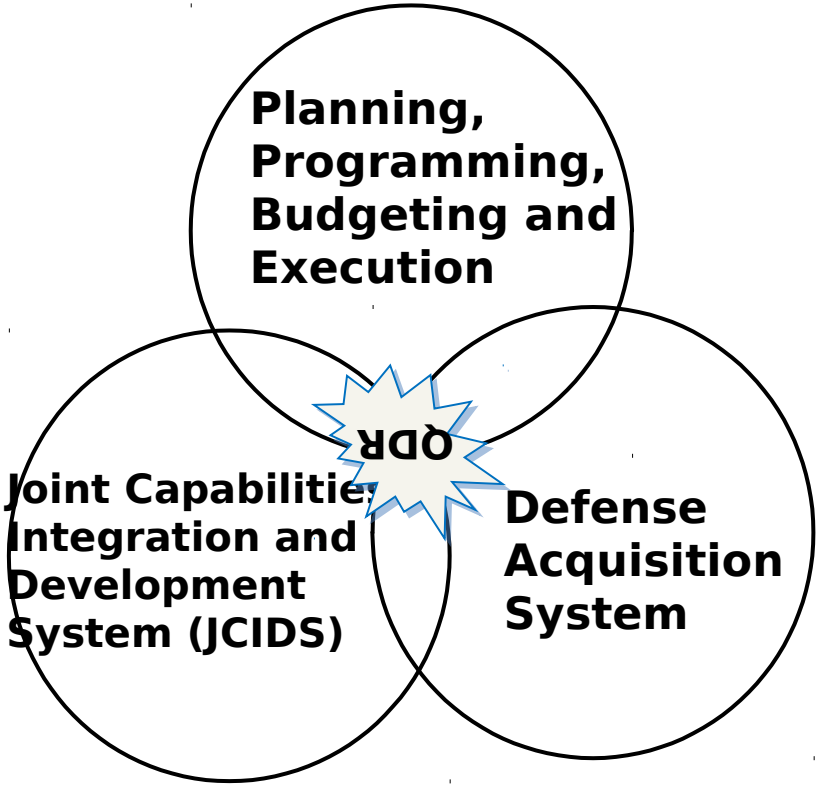


- PPBE Overview
- Building Blocks
  - FYDP, MFP, Program Elements
- PPBE Process and Schedule
- Resource Allocation Process Overlap
- Related Topics

FM Scope: From Requirement to Capability

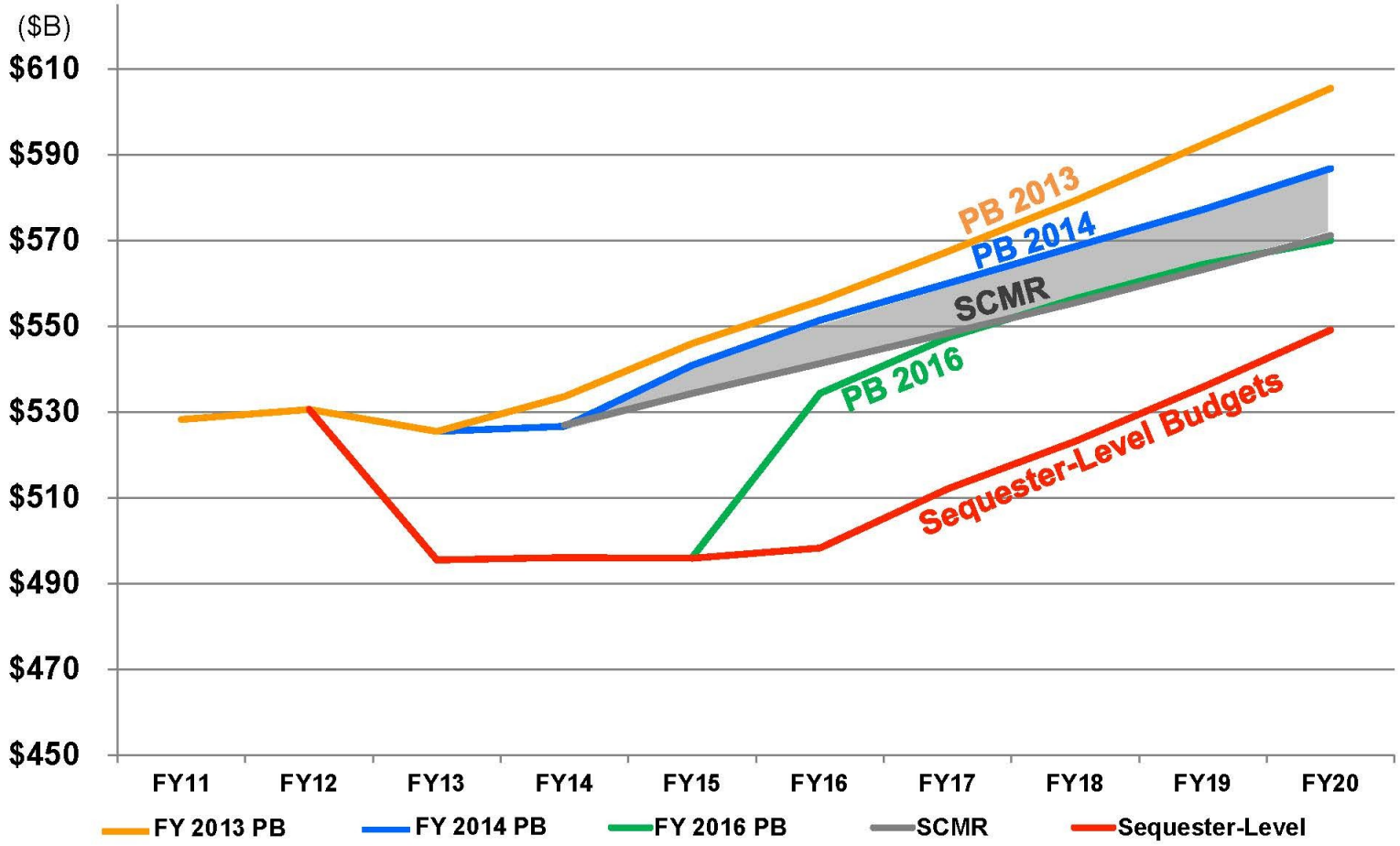


Three Major DoD Management Systems


Planning, Programming, Budgeting and Execution
QDR
Joint Capabilities Integration and Development System (JCIDS)
Defense Acquisition System

PB 16 Base Budget Supports the 2014 QDR Strategy

Sequester-Level Budgets Do Not

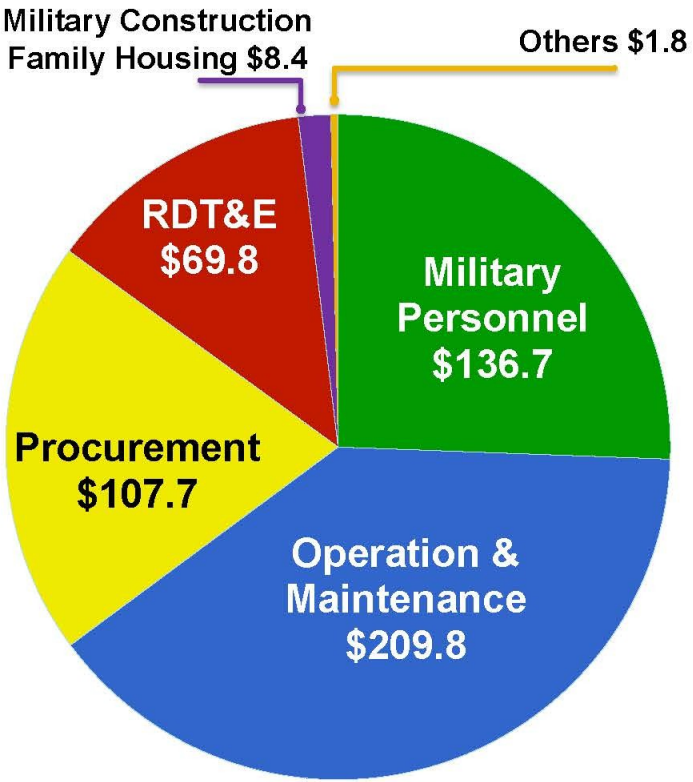


SCMR = Strategic Choices and Management Review

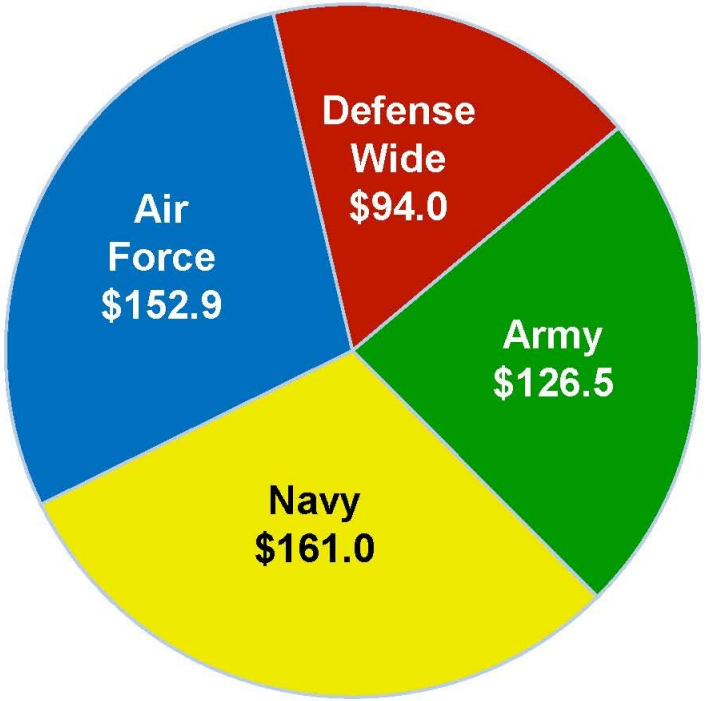
FY 2016 President's Budget

(Dollars in Billions)

Base Budget



Budget By Military Department



Budget Request: $534.2 billion

FY 16 PB (cont.)

- Service Shares (PB 16)
  - Navy/MC 30%
  - Air Force 29%
  - Army 24%

- Modernization Accounts (Procurement and RDT&E)
  - Procurement $108B (PB16) vs $90B (PB15) vs $107B (PB10)
    - For the fight 10 years from now
  - RDT&E $70B (PB16) vs $63B (PB15) vs $79B (PB10)
    - For the fight 20 years from now (Acq programs in development)
    - For the fight 30 years from now (Science and Technology efforts)
      - $12B floor

PPBE Phases

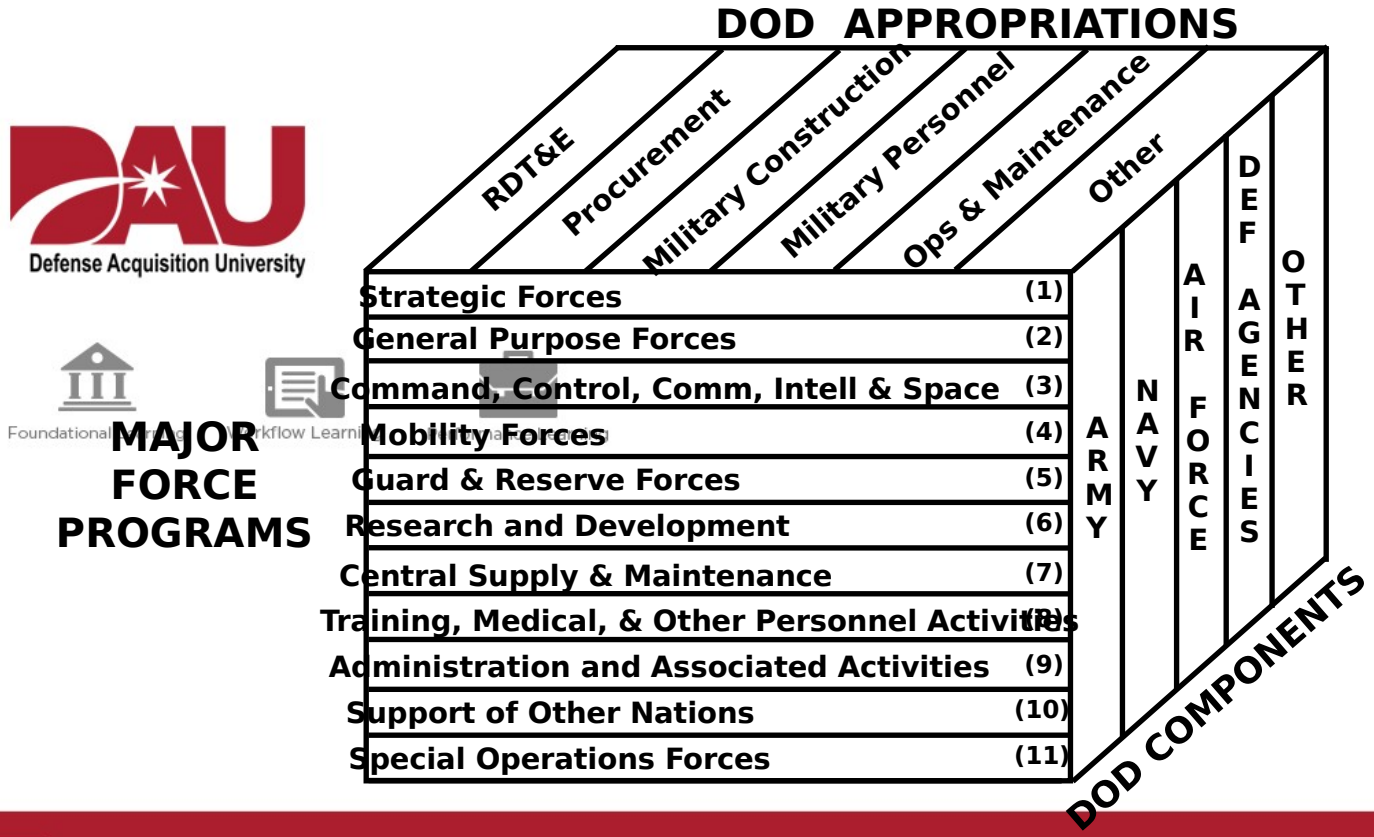
Future Years Defense Program (FYDP)

- Computer Database Maintained by OSD CAPE
- Contains Approved Force Structure and Resources for all Defense Programs
- Expected to be updated 3 Times this PPBE Cycle:
  - Program Objectives Memorandum (POM) – Jul
  - Budget Estimate Submission (BES) Sep
  - President's Budget (PB) - Feb
- Reflects PY, CY, BY, + 4 Out-Years

  1 16 17 18 19 20 21

  5 3 additional years for force structure only
- Component PPBE databases
  - Navy: PBIS
  - Air Force : ABIDES
  - Army: PROBE

Future Years Defense Program (FYDP)



Program Elements

PROGRAM ELEMENT (PE): Smallest aggregation of resources normally controlled by OSD

- PE NUMBER: Used to track and identify resources; seven digit number followed by an alphabetic suffix

- **PROGRAM 2 (GENERAL PURPOSE FORCES)**
  - **0203752A - Aircraft Engine CIP**
  - **0204136N - F/A-18 Squadrons**
  - **0207163F - AMRAAM**
- **PROGRAM 3 (C3, INTEL & Space)**
  - **0303158A - Joint Command and Control Program (JC2)**
  - **0307207N - Aerial Common Sensor (ACS)**
  - **0305164F - NAVSTAR GPS (User Equipment)**

A - ARMY
N - NAVY
M - MARINE
F - AF
D - OSD
C - MDA
E - DARPA
J - JCS
S - DLA
BB - SOCOM
DBD - DFAS

Ref: DoD 7045.7 - H

PPBE – Planning Phase Lead by USD (P)

www.DAU.mil

YEAR 1 ***FEB/MAR*** — Elapsed Time: 15-16 Months — ***YEAR 2*** ***APR/MAY***

President
National Security Council
CIA/DIA/JCS/OSD

Planning Phase focus:

- **Threat vs. Capabilities**
- **Update strategy**
- **Guidance for programming & budgeting**

CIA – Central Intelligence Agency
COCOM – Combatant Commander
CPR – Chairman's Program Recommendation
DIA – Defense Intelligence Agency
DPG – Defense Planning Guidance
JCS – Joint Chiefs of Staff
NDS – National Defense Strategy
NMS – National Military Strategy
NSS – National Security Strategy
OSD – Office of the Secretary of Defense
QDR – Quadrennial Defense Review
SCMR – Strategic Choices and Management Review
USD(P) – Undersecretary of Defense (Policy)

Defense Acquisition University

NSS

Foundational Learning | Workflow Learning | Performance Learning

Every 4 Years

OSD Level

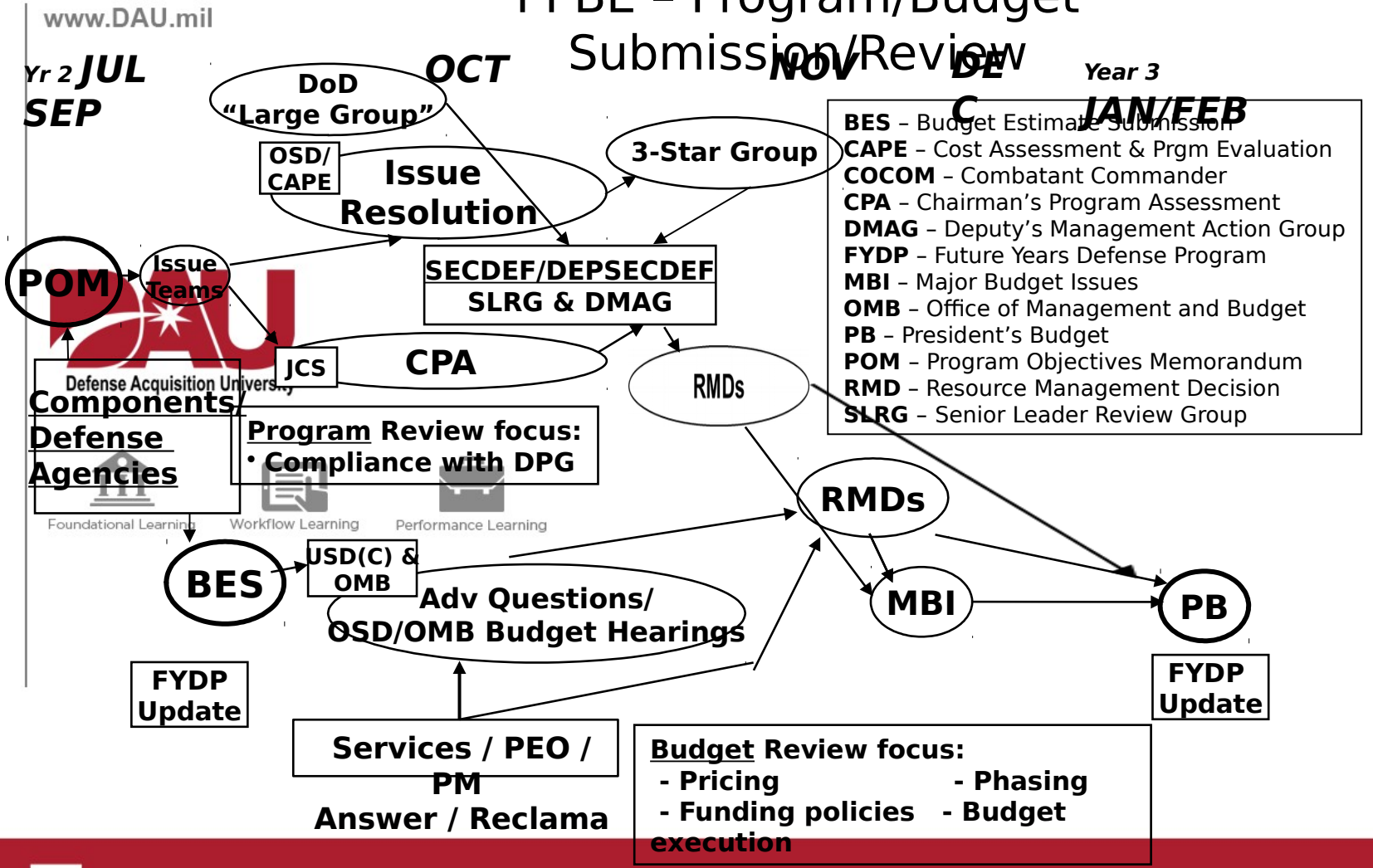
NDS → QDR → DPG → Guidance for POM/BES submission and OSD Integrated Program/Budget Review

JCS Level

NMS → CPR

(JCS, COCOMs, SERVICES)

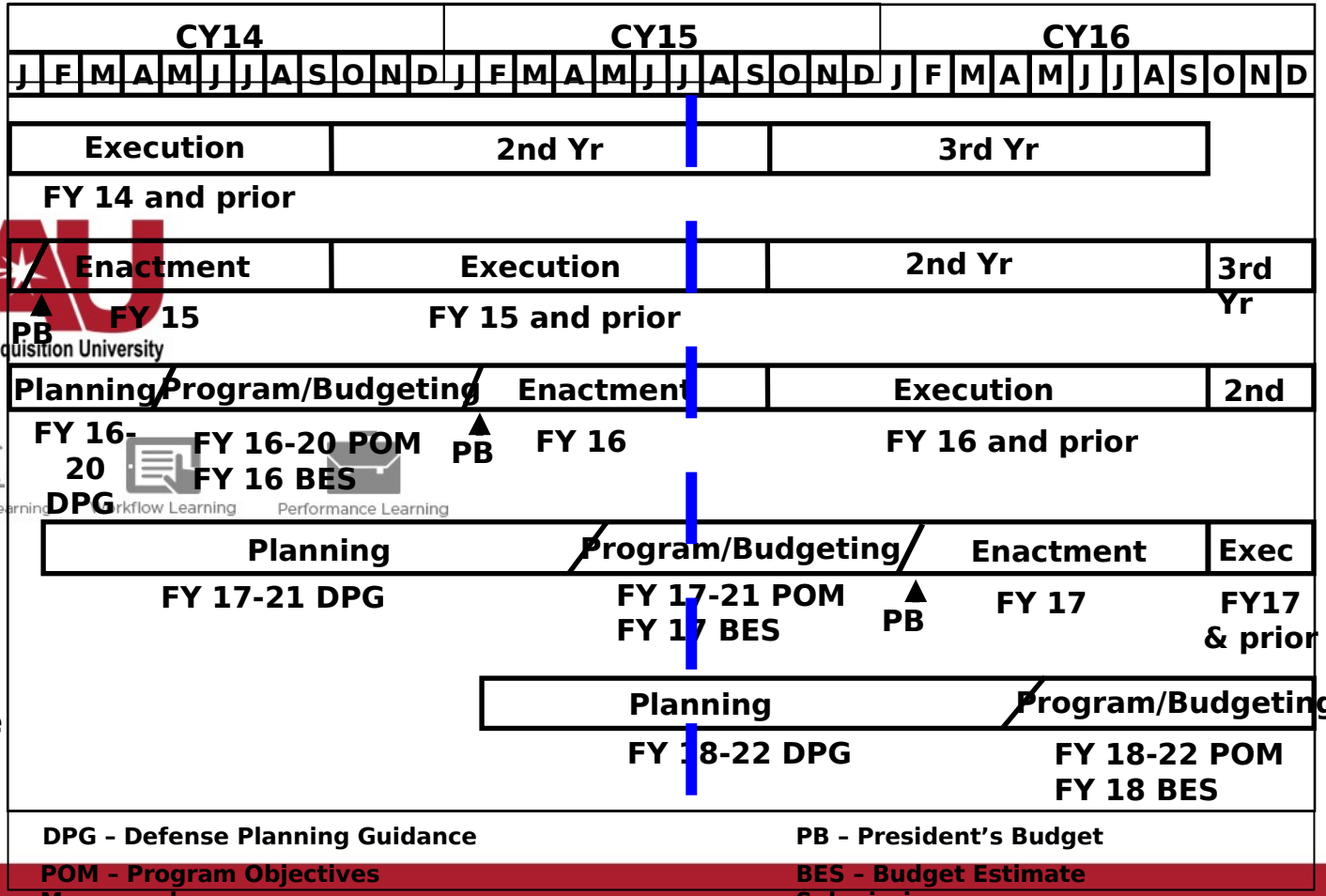
PPBE – Program/Budget Submission/Review



FY 17–21 Program/Budget Review Schedule

Mar 15	Fiscal Guidance Issued
6-10 Jul 15	Component POM Briefs to 3-Stars
13 Jul 15	Component POM Submissions Due (Line item/PE level of detail)
5 Aug 15*	Issue Nominations Due
17 Aug 15	Issue Nomination Disposition
17 Aug – 2 Nov 15	Program Review
8 Sep 15	BES due to OSD
11 Sep 15	Budget Justification Material due to OSD
11 Sep – 23 Nov 15	Budget Review
2 Nov 15	Programmatic RMDs
23 Nov 15	Budget RMDs
18 Dec 15	Budget Lock
1 Feb 16	President’s Budget Released

Resource Allocation Process Overlap



Related Topics

- **Other Affordability Topics:**
  - **When should you start becoming concerned about affordability?**
  - **APB trade space (Cost, Schedule, Performance)**
    - **What performance are you willing to trade off?**
    - **At what point should we relook the AoA?**
    - **Should Objective equal Threshold (O=T)?**
    - **How firm is the threshold value?**
  - **Cost as an Independent Variable (CAIV)**
- **How do you get funding for an AoA? O&M? RDT&E?**
- **Who is responsible for the AoA?**
- **How long does it take to get an approved capability document?**
  - **How can it be done faster?**
- **How long does it take to get funding for a program?**
  - **How can it be done faster?**
- **How fast do you really have to have the capability?**
- **What do you really need now versus what can wait?**
- **PPBE timing adequacy?**
  - **Time Now versus desired IOC date versus time for each acq phase**

Backups

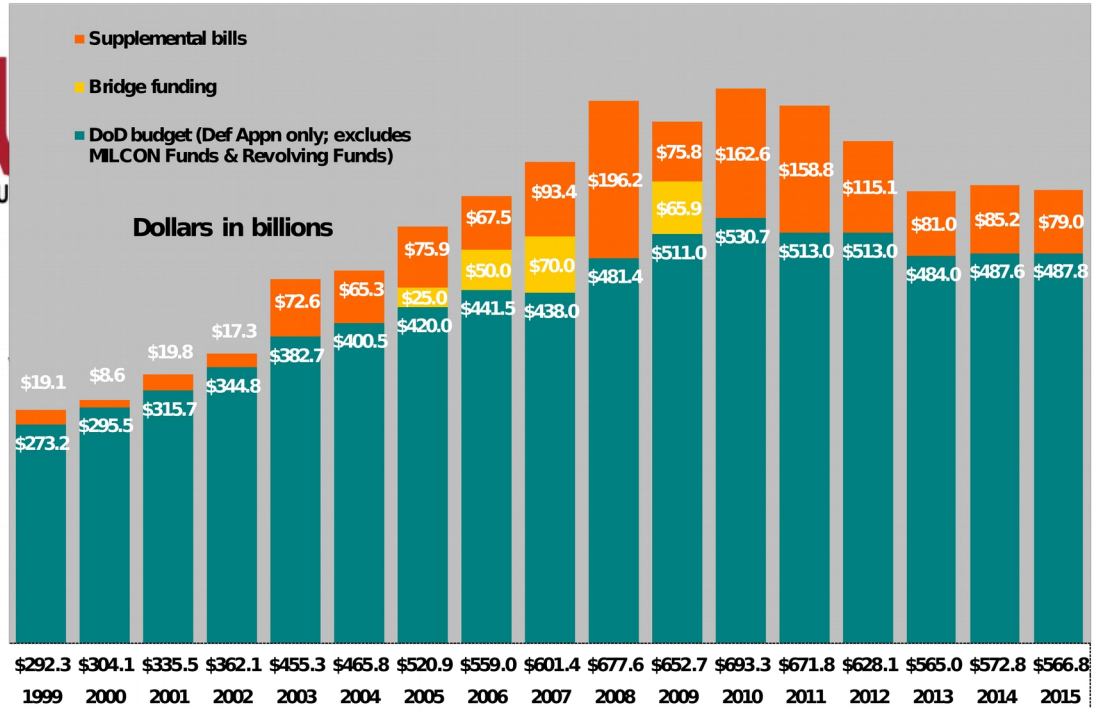
Foundational Learning

Workflow Learning

Performance Learning

Defense Topline Budget

DoD Supplemental Appropriations



Total Yearly Spending

Defense Acquisition U

Foundational Learning

Better Buying Power 2.0 (Apr 2013)

Achieve Affordable Programs
- Mandate affordability as a requirement
- Institute a system of investment planning to derive affordability caps
- Enforce affordability caps

Control Costs Throughout the Product Lifecycle
- Implement "should cost" based management
- Eliminate redundancy within warfighter portfolios
- Institute a system to measure the cost performance of programs and institutions and to assess the effectiveness of acquisition policies
- Build stronger partnerships with the requirements community to control costs
- Increase the incorporation of defense exportability features in initial designs

Incentivize Productivity & Innovation in Industry and Government
- Align profitability more tightly with Department goals
- Employ appropriate contract types
- Increase use of Fixed Price Incentive contracts in Low Rate Initial Production
- Better define value in "best value" competitions
- Only use LPTA when able to clearly define Technical Acceptability
- Institute a superior supplier incentive program
- Increase effective use of Performance-Based Logistics
- Reduce backlog of DCAA Audits without compromising effectiveness
- Expand programs to leverage industry's IR&D

Eliminate Unproductive Processes and Bureaucracy
- Reduce frequency of higher headquarters level reviews
- Re-emphasize AE, PEO and PM responsibility, authority, and accountability

Promote Effective Competition
- Emphasize competition strategies and creating and maintaining competitive environments
- Enforce open system architectures and effectively manage technical data rights
- Increase small business roles and opportunities
- Use the Technology Development phase for true risk reduction

Improve Tradecraft in Acquisition of Services
- Assign senior managers for acquisition of services
- Adopt uniform services market segmentation
- Improve requirements definition/prevent requirements creep
- Increase small business participation, including through more effective use of market research (combined SB and MR initiatives)
- Strengthen contract management outside the normal acquisition chain – installations, etc.
- Expand use of requirements review boards and tripwires

Improve the Professionalism of the Total Acquisition Workforce
- Establish higher standards for key leadership positions
- Establish stronger professional qualification requirements for all acquisition specialties
- Increase the recognition of excellence in acquisition management
- Continue to increase the cost consciousness of the acquisition workforce – change the culture

“Will Cost” vs “Should Cost”
USD (AT&L) and USD(C) 22 Apr 11 Memo

- Will Cost
  - Used for programming and budgeting
  - Used for acquisition program baselines (APBs)
  - Used for all reporting requirements external to DoD

- Should Cost
  - Scrutinize every element of govt and contractor costs
  - 3 ways to develop should cost estimates:
    - Bottoms –Up estimate
    - Determine specific discrete and measurable items
    - Use competitive contracting and contract negotiations to identify should cost savings (old FAR definition)

Resource Management System

- **PPBE is the Primary Resource Management System for DoD:**
  - **Articulates strategy**
  - **Identifies size, structure and equipment for military forces**
  - **Sets programming priorities**
  - **Allocates resources**
  - **Evaluates actual output against planned performance and adjusts resources as appropriate**

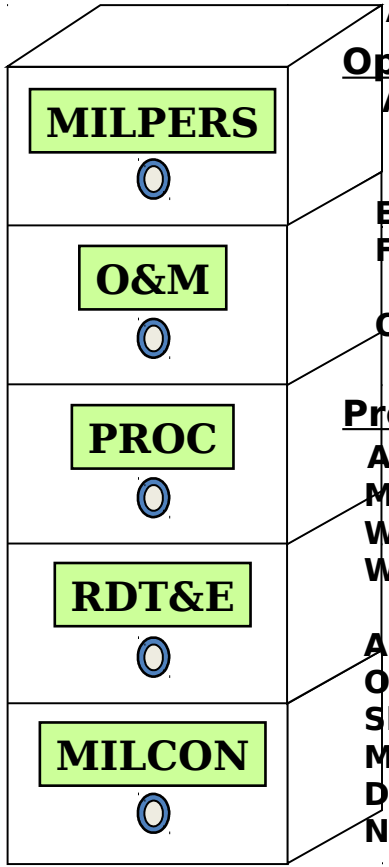
Defense Acquisition University
Foundational Learning
Workflow Learning
Performance Learning

Senior Leader Review Group

- Secretary of Defense
- Deputy Secretary of Defense
- Secretary or Under Secretary of the Army
- Secretary or Under Secretary of the Navy
- Secretary or Under Secretary of Air Force
- Chairman Joint Chiefs of Staff
- Vice Chairman Joint Chiefs of Staff
- Under Secretary of Defense (AT&L)*
- Under Secretary of Defense (Policy)*
- Under Secretary of Defense (Comptroller) /Chief Financial Officer*
- Under Secretary of Defense (Intelligence)*
- Under Secretary of Defense (P&R)*
- Commandant or Assistant Commandant of the Marine Corps
- Director of Administration and Management
- Chief or Vice Chief of Staff of the Army
- Chief or Vice Chief of Naval Operations
- Chief of Staff or Vice Chief of the Air Force
- General Counsel
- ASD (Legislative Affairs)
- ASD (Networks & Information Integration/Chief Information Officer
- ASD for Public Affairs
- Director, Cost Assessment and Program Evaluation
- Director, Joint Staff
- Deputy Chief Management Officer
- Chief, National Guard Bureau

* Or Principal Deputy

Defense Appropriations
"Colors of Money"



Military Personnel (MILPERS)
- Active & Reserve Forces

Operation & Maintenance (O&M)
- Active & Reserve Forces (civilian Salaries, supplies, spares, fuels, travel, etc…)
- Environmental Restoration
- Former Soviet Union Threat Reduction
- Overseas Humanitarian, Disaster, & Civic Aid

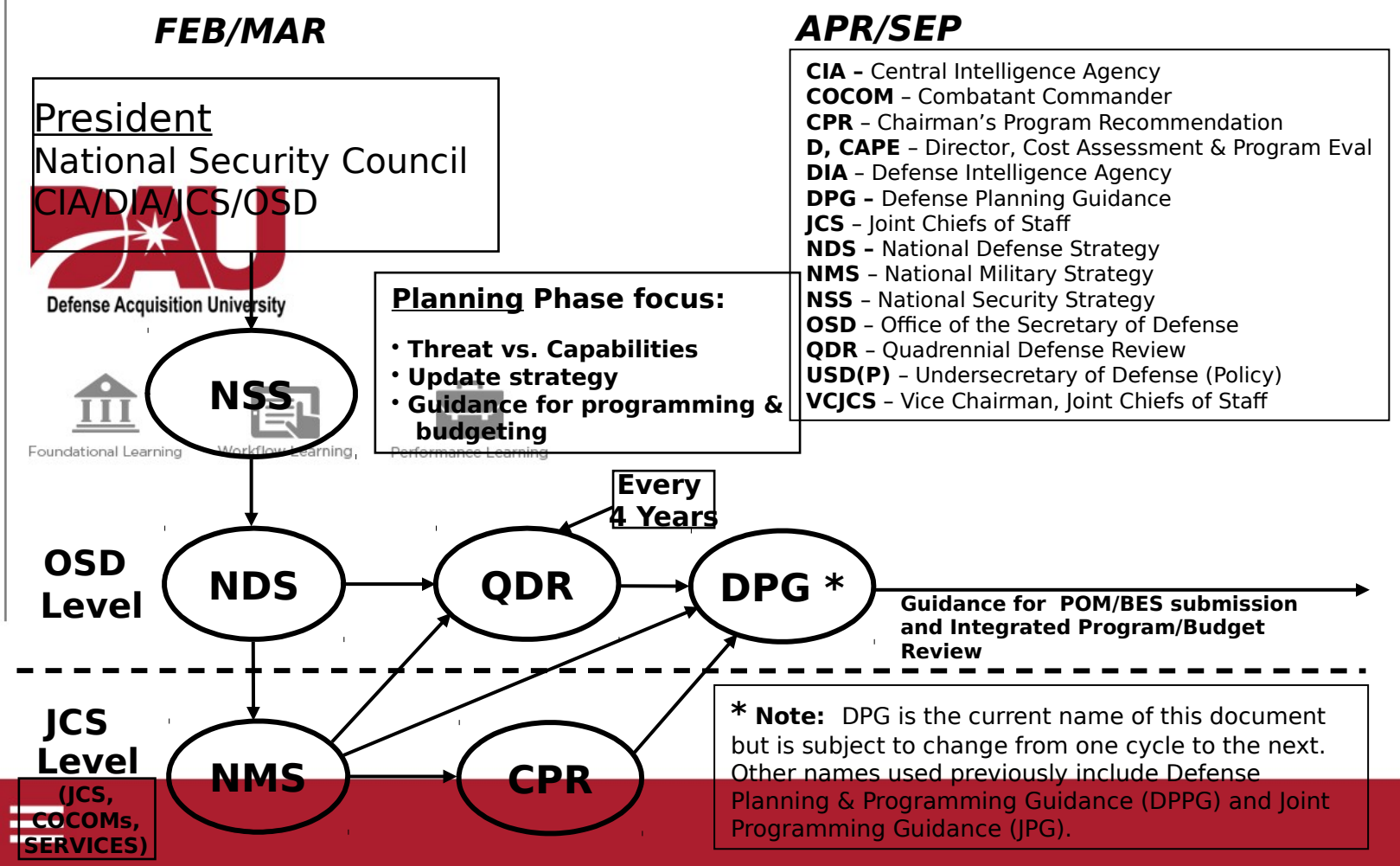
Procurement
- Aircraft
- Missiles
- Weapons
- Weapons & Tracked Combat Vehicles
- Ammunition
- Other Procurement
- Shipbuilding & Conversion
- Marine Corps
- Defense wide procurement
- National Guard & Reserves

Research, Development, Test & Evaluation (RDT&E)
- Basic Research
- Applied Research
- Advanced Technology Development
- Advanced Component Development & Prototypes
- System Development & Demonstration
- RDT&E Management Support
- Operational Systems Development

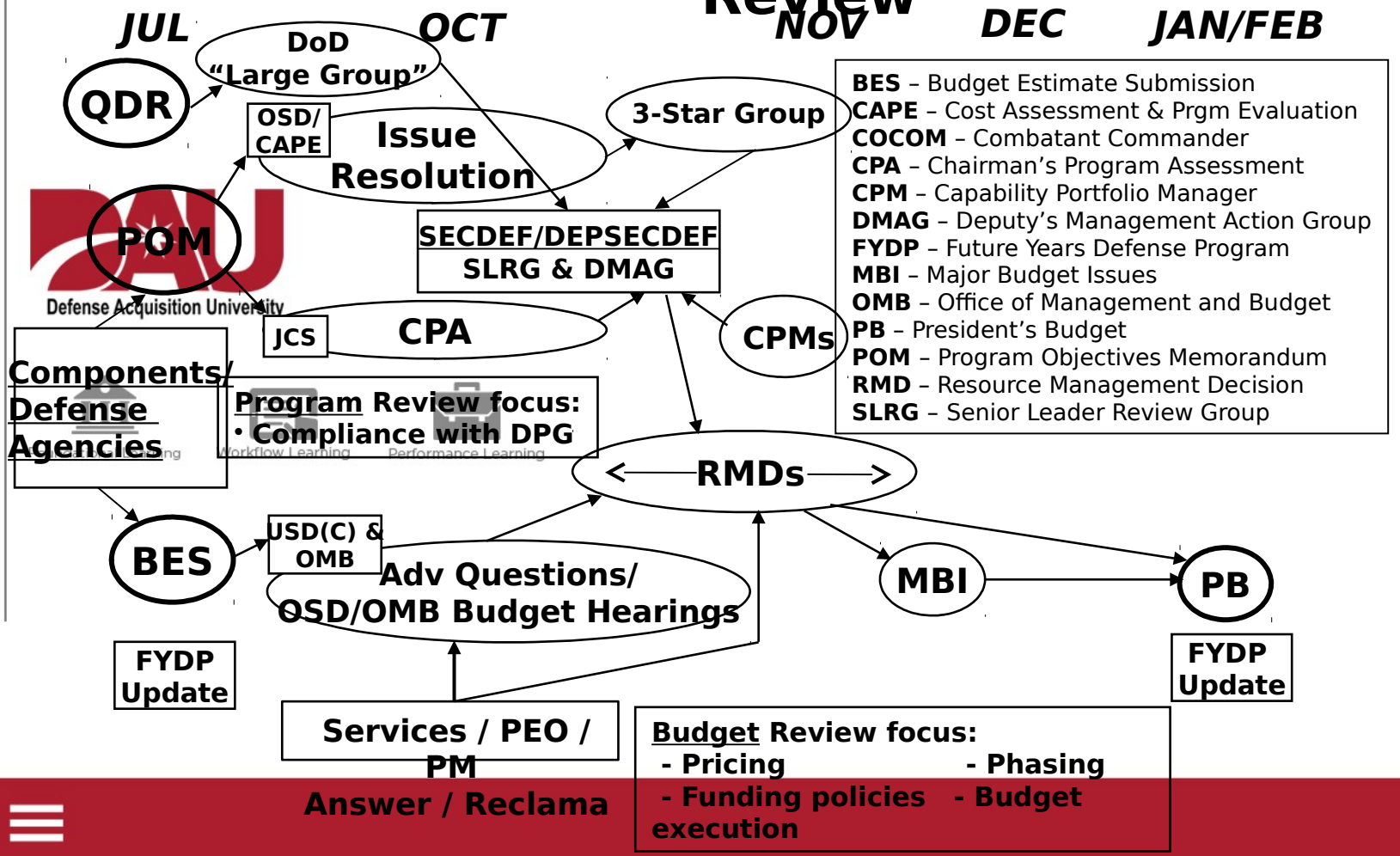
Military Construction (MILCON)
- Facilities
- Family Housing
- Base Realignment & Closure (BRAC)

Other
- Defense Health Program
- Chemical Agents & Munitions Destruction

PPBE – Planning Phase


FEB/MAR
President
National Security Council
CIA/DIA/JCS/OSD
Defense Acquisition University
Planning Phase focus:
• Threat vs. Capabilities
• Update strategy
• Guidance for programming & budgeting
APR/SEP
CIA – Central Intelligence Agency
COCOM – Combatant Commander
CPR – Chairman's Program Recommendation
D, CAPE – Director, Cost Assessment & Program Eval
DIA – Defense Intelligence Agency
DPG – Defense Planning Guidance
JCS – Joint Chiefs of Staff
NDS – National Defense Strategy
NMS – National Military Strategy
NSS – National Security Strategy
OSD – Office of the Secretary of Defense
QDR – Quadrennial Defense Review
USD(P) – Undersecretary of Defense (Policy)
VCJCS – Vice Chairman, Joint Chiefs of Staff
NSS
Foundational Learning
Workflow Learning
Performance Learning
Every 4 Years
OSD Level
NDS
QDR
DPG *
Guidance for POM/BES submission and Integrated Program/Budget Review
JCS Level
(JCS, COCOMs, SERVICES)
NMS
CPR
* Note: DPG is the current name of this document but is subject to change from one cycle to the next. Other names used previously include Defense Planning & Programming Guidance (DPPG) and Joint Programming Guidance (JPG).

PPBE – Integrated Program/Budget Review



- Chapter 3.2.1. -Affordability in the DoD Decision Support System
  - JCIDS – Balances cost vs performance in establishing KPPs
  - Milestone A – 10 U.S.C. 2366a – Congressional certification (for MDAPs)
    - MDA certifies to Congress that a cost estimate has been submitted
      - » After consultation with JROC
      - » With Concurrence from D,CAPE
    - PM must notify MDA between MS A and MS B, if
      - » 1. Projected cost of program exceeds the cost estimate by 25% OR

Affordability DAG (2/3)

- Milestone B – 10 U.S.C. 2366b – Congressional certification
  - Based on a business case analysis, MDA certifies to Congress:
    - The program is affordable
    - Trade-offs between C/S/P have been made
    - D,CAPE concurs with reasonable cost and schedule estimates
    - Funding is available in the FYDP

Affordability DAG (3/3)

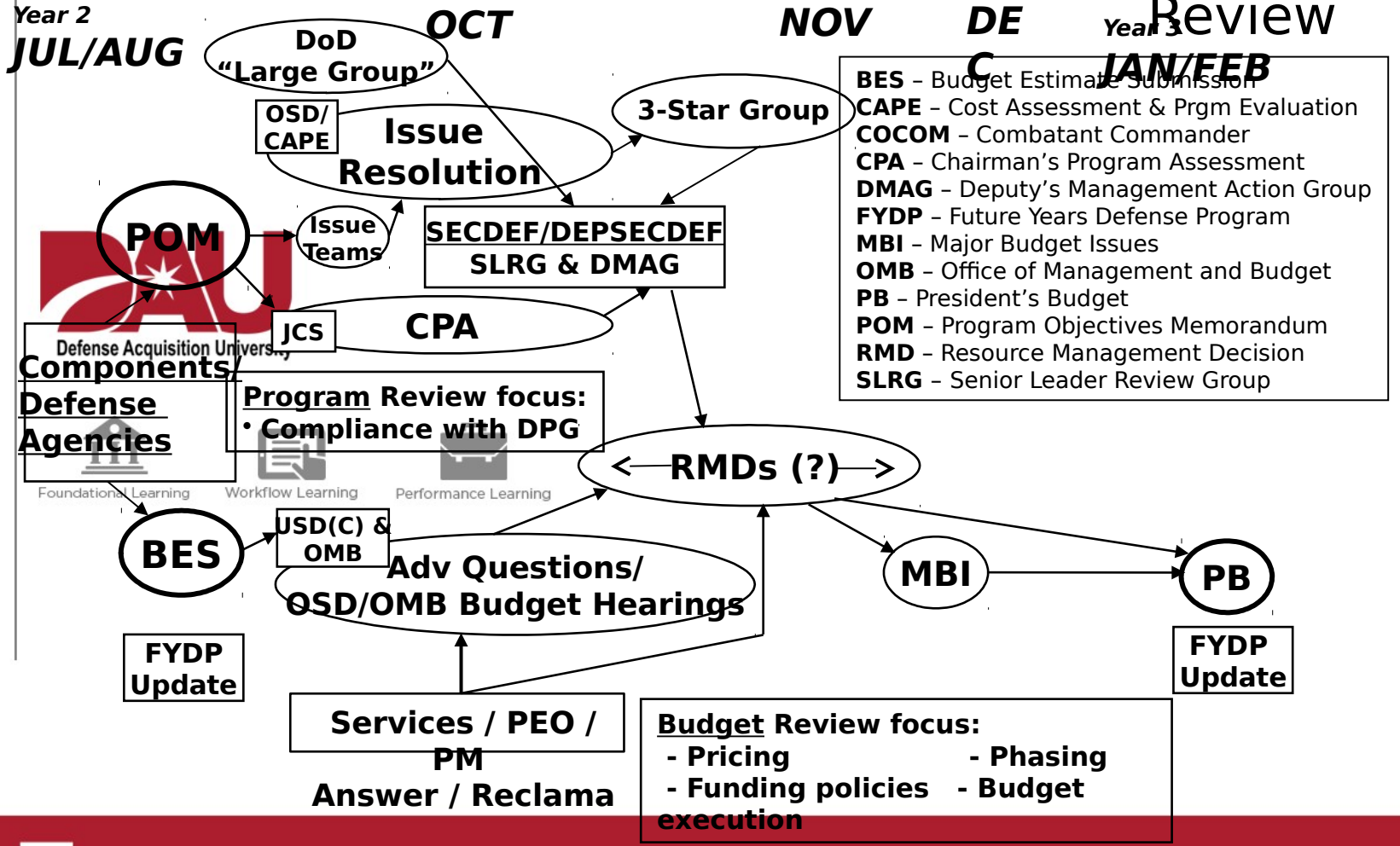
- 3.2.2 Affordability Assessments
  - Projected annual funding – 4-step process
    - Address acq and O&S funding, force structure, and manpower requirements
    - FYDP +/- 12 years
  - Unit cost approach
    - Compare unit cost of current program to unit cost of legacy system
    - Use base year dollars

Affordability DAG (4/4)

- 3.2.3 Full Funding
  - At MS B, the most likely cost dollars and manpower needed to carry out the acquisition strategy are in the FYDP
  - For MDAPs, the MDA must certify this in the 2366b certification and D,CAPE must concur
  - MDAs should assess this for all major decision points for all acq programs

PPBE – Integrated Program/Budget Review

www.DAU.mil



FY 16–20 Program/Budget Review Schedule

3 Apr 14	Fiscal Guidance Issued
2-12 Sep 14	Component POM Briefs to 3-Star/DMAG
2 Sep 14	Component POM Submissions Due (Databases Lock)
15 Sep 14	Budget Justification Material Due to OSD/OMB (POM)
18 Sep 14	Issue Nominations Due
29 Sep 14	Issue Nomination Disposition
3 Oct 14	Refresh of BCA Cap (FY 16 Submission Due)
Oct - Nov 14	Program/Budget Review and Issue Team Analysis
19 Dec 14	Budget Lock
2 Feb 15	President's Budget Released

NOTE: This chart reflects the official OSD planned dates for these events

Source: Joint CAPE & USD(C) memo dated 22 May 2014

www.DAU.mil

RQM 310

Getting from the AoA to KPPs

Defense Acquisition University

Foundational Learning

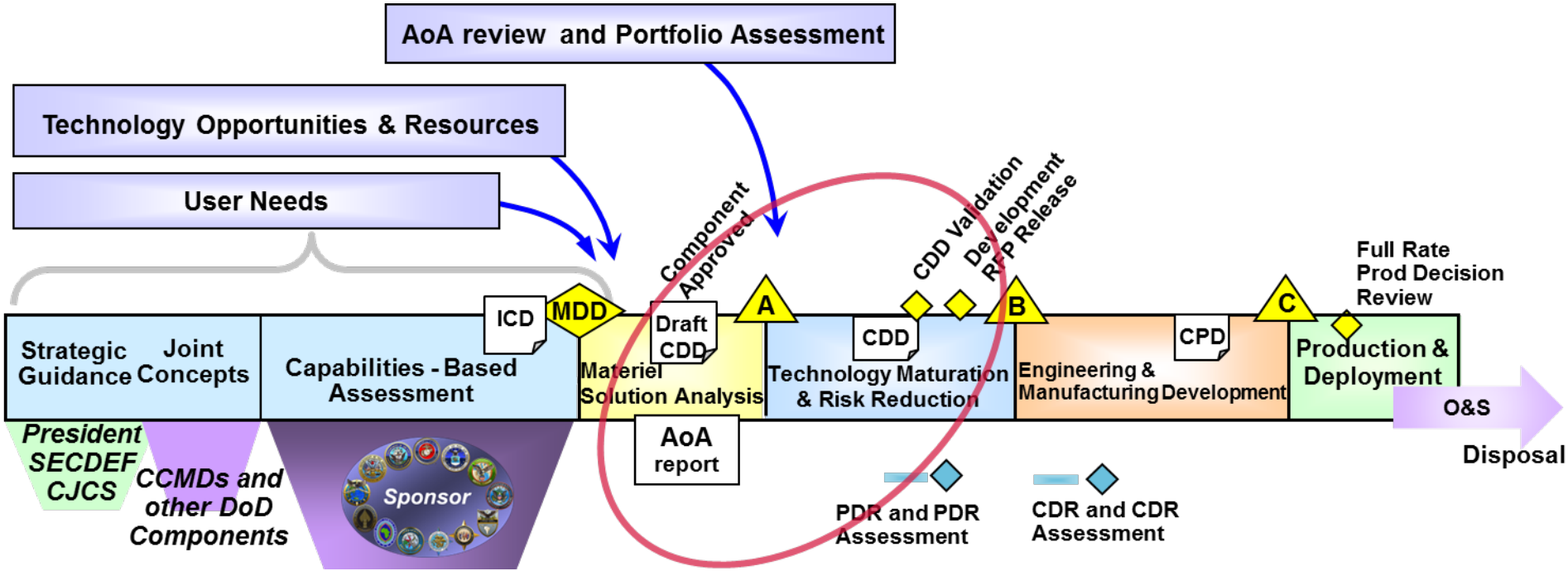
Workflow Learning

Performance Learning

Lesson Objectives

Given a real-world program with an ICD, AoA Study Guidance and an AoA--take the example from the ICD through KPP development

AoA to KPP


AoA review and Portfolio Assessment
Technology Opportunities & Resources
User Needs
Component Approved
CDD Validation
Development RFP Release
Full Rate Prod Decision Review
ICD
MDD
A
B
C
Draft CDD
CDD
CPD
Strategic Guidance
Joint Concepts
Capabilities - Based Assessment
Materiel Solution Analysis
Technology Maturation & Risk Reduction
Engineering & Manufacturing Development
Production & Deployment
O&S
Disposal
AoA report
President SECDEF CJCS
CCMDs and other DoD Components
Sponsor
PDR and PDR Assessment
CDR and CDR Assessment

AoA

An ideal AoA provides essential information on the decision space available to make executive decisions

- Prioritized, quantified, contextualized capability gaps
- Feasible alternatives that are affordable and mitigate the capability gaps
- The trades within and across alternatives among cost, schedule, and performance
- Transparent analysis of recognized quality
- Sensitivity analysis—how robust are the solutions?

Do AoAs cover “knee-in-the-curve” analysis? This is different than sensitivity analysis….but it does kind of get into trade space.

KPPs & KSAs

- **Key Performance Parameters (KPP) –** are performance attributes of a system considered critical or essential to the development of an effective military capability.

- They are **measurable, testable and quantifiable**.

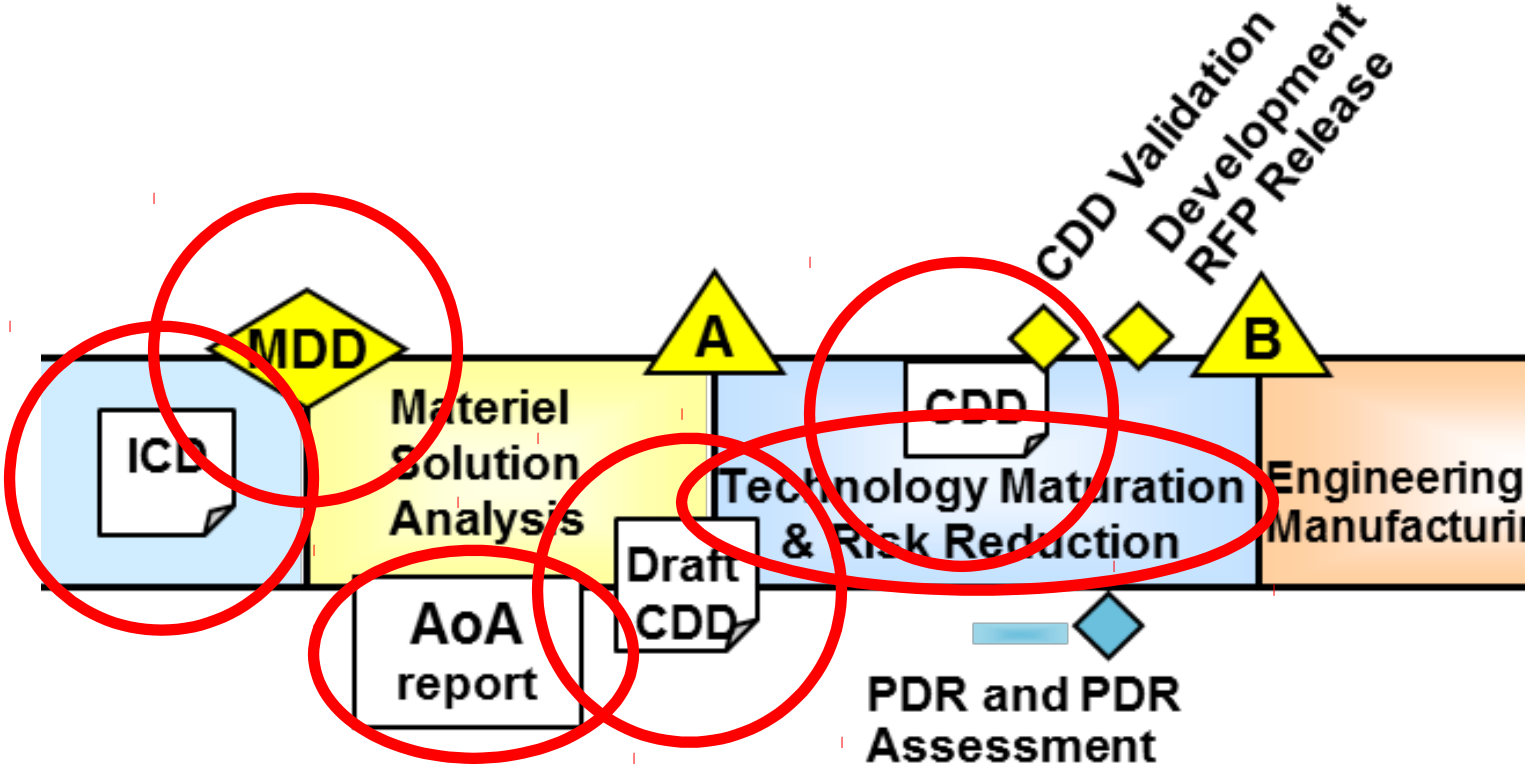
- **Key System Attribute (KSA) –** attributes or characteristics considered essential to achieving a balanced solution / approach to a system, but not critical enough to be designated a KPP. KSAs must be measurable, testable and quantifiable

Original Capability Gaps in ICD

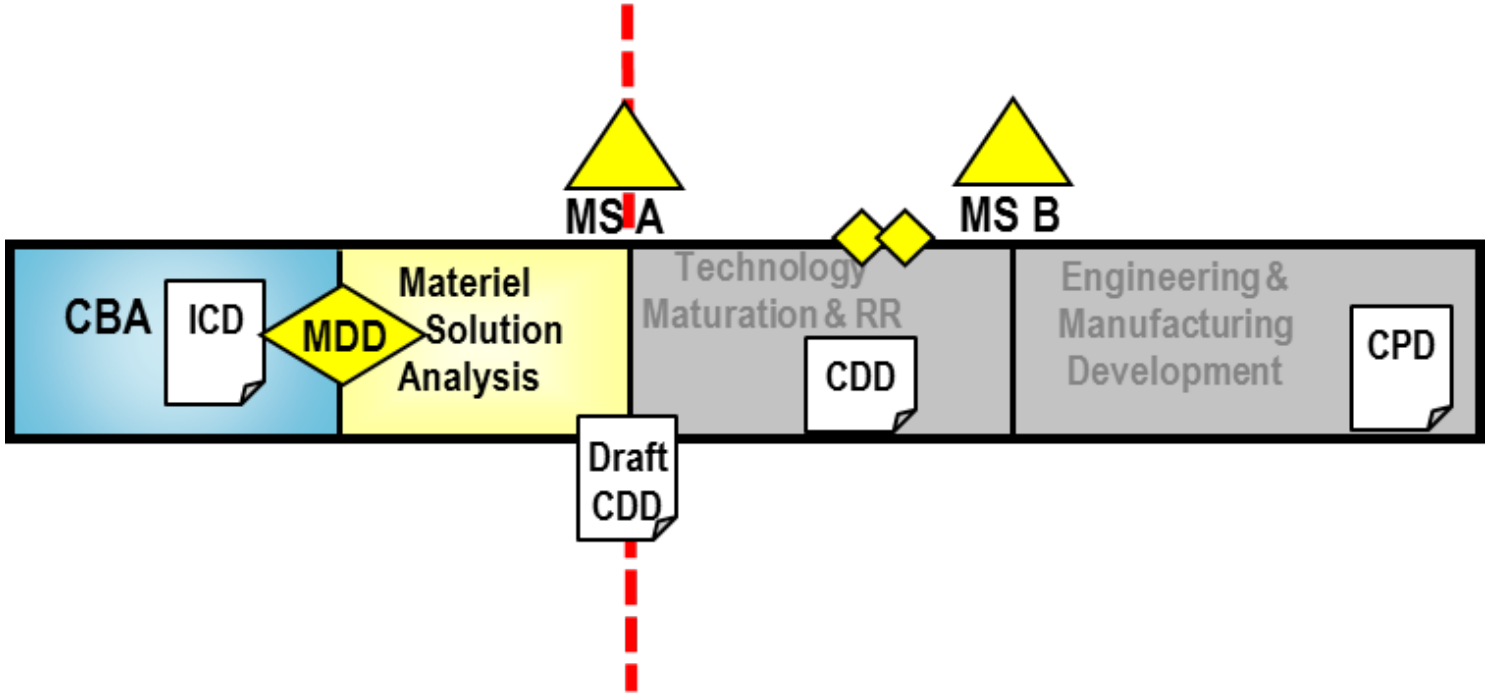
The GCV ICD identified several gaps in current capability-We will concentrate on:

- **Inability to detect mines and standoff (Survivability).**
- **Light vehicle protection against kinetic, chemical and tandem blast warheads (Protection).**
- **Maneuver for positional advantage in all terrain (Road and cross country speed, range and urban mobility)**

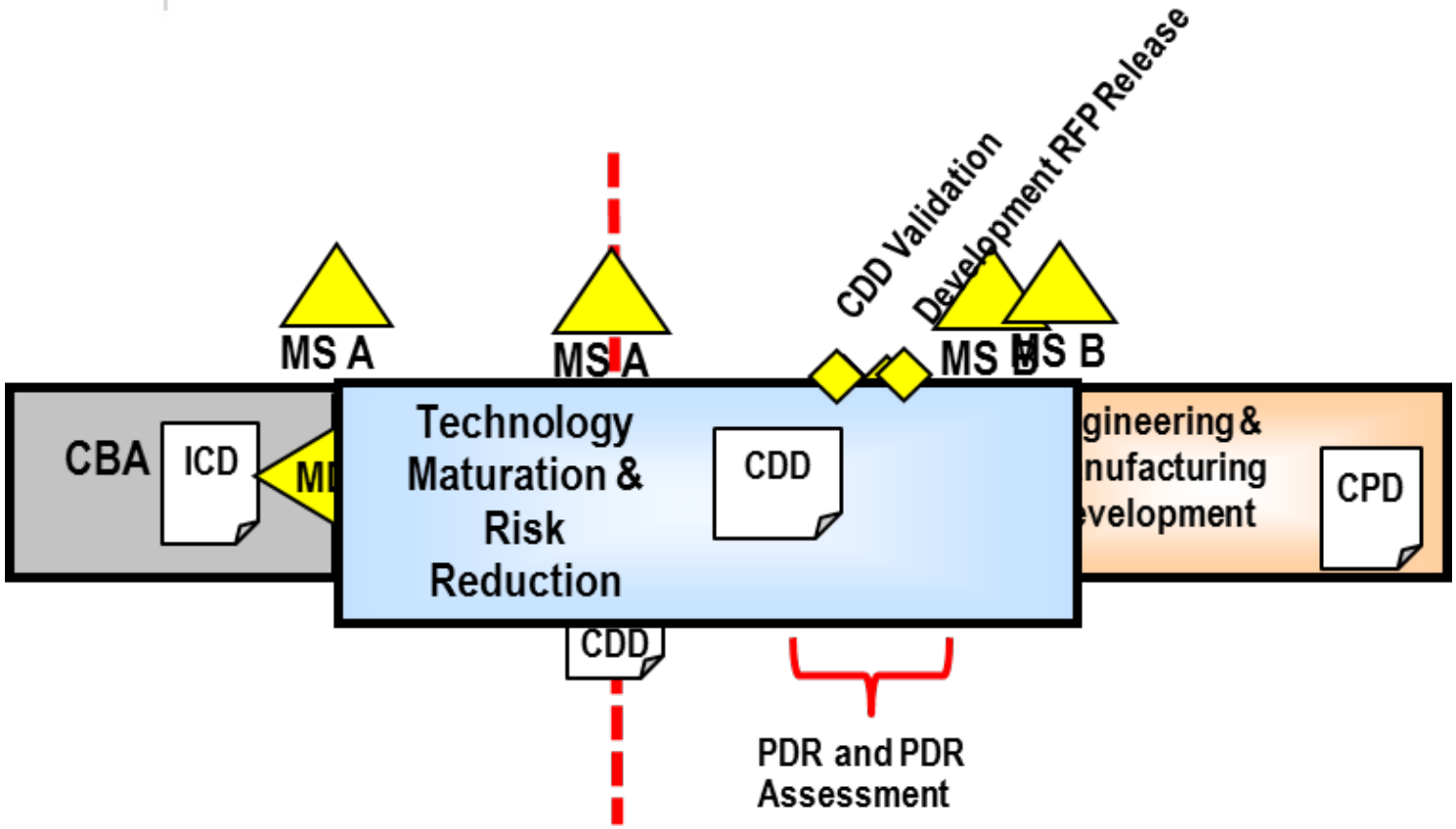
AoA to KPP


CDD Validation
Development
RFP Release
MDD
A
B
ICD
Materiel
Solution
Analysis
CDD
Technology Maturation
& Risk Reduction
Engineering
Manufacturi
Draft
CDD
AoA
report
PDR and PDR
Assessment

AoA to KPP


MS A
MS B
CBA
ICD
MDD
Materiel Solution Analysis
Technology Maturation & RR
CDD
Engineering & Manufacturing Development
CPD
Draft CDD

AoA to KPP


MS A
MS A
CDD Validation
Development RFP Release
MS B
MS B
CBA
ICD
Technology Maturation & Risk Reduction
CDD
gineering &
nufacturing
velopment
CPD
CDD
PDR and PDR Assessment

Guidance on Structure of the Study

Per the guidance provided by the CAPE (Dec 2011 memo) The AMPV AoA – " Should provide full consideration to the trades among cost, schedule and performance objectives within and across alternatives to identify a cost effective acquisition strategy."

So -- 5 main areas evolved: **Assess performance, Identify sustainment impacts, Conduct a Schedule Assessment, Determine Lifecycle Costs, Determine Affordability**

Study Guidance

- 5 Alternatives
  - Base Case – M113 FoV
  - Mixed solution to include M113, Bradleys, MRAPs and Strykers
  - Other Non-developmental solutions not included above
  - New start including JLTV and GCV variants
  - Mixed solution with specialized vehicles by mission

M113 Family of Vehicles

Medical Treatment

Mission C²

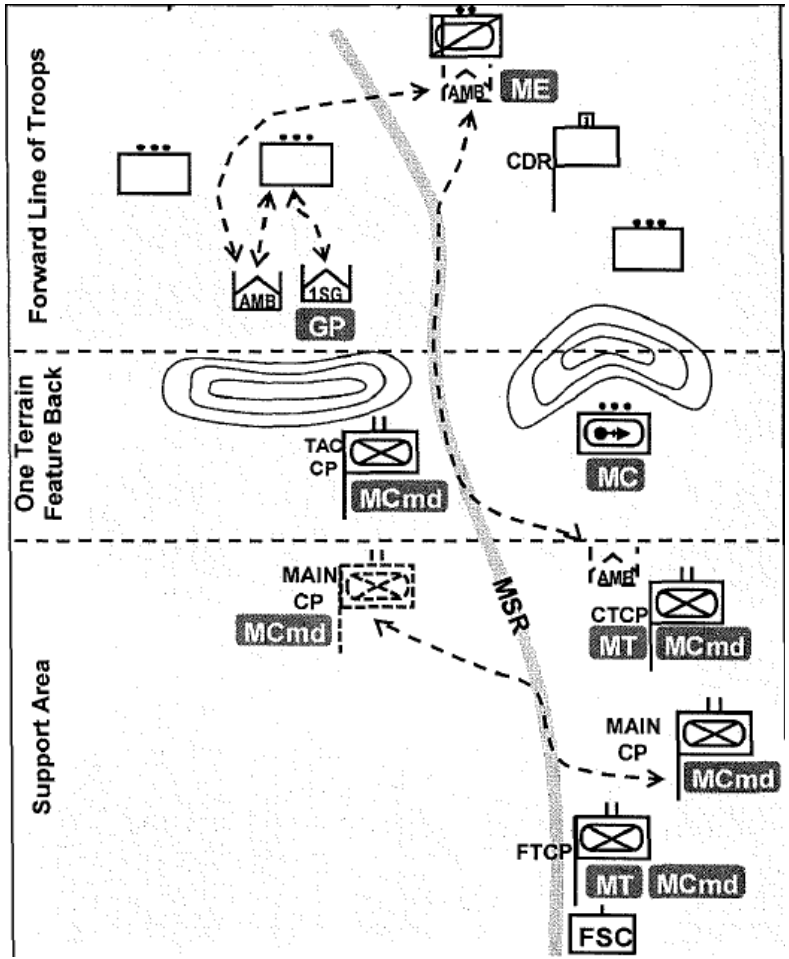
General Purpose

Mortar Carrier

Medical Evacuation

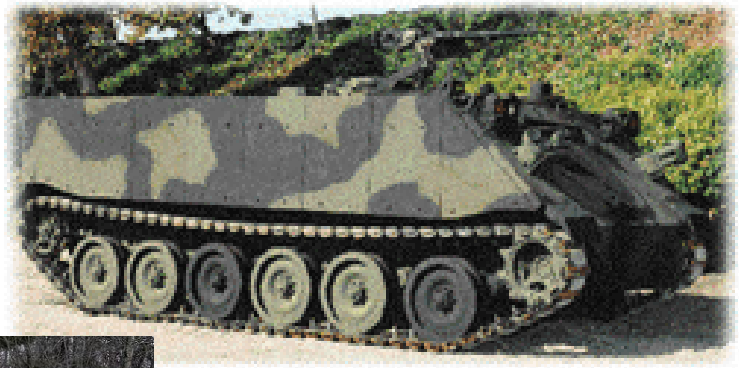
M113 CONOPS

- The general purpose (GP), medical evacuation (ME) conduct maneuver with the forward line of troops to conduct medical evacuation tasks.
- The mortar carrier (MC) and battalion mission command (MCmd) roles maneuver within 2 - 4 km of the forward line of troops and utilize terrain for protection
- The medical treatment (MT) and brigade MCmd mission roles maneuver 10-20 km back), utilizing terrain to maneuver when possible.



AoA Alternatives

M113 – APC (Base Case)



MTLV – Mobile Tactical Light Vehicle

CMTV – Caiman Multi-Terrain Veh

M2A3-T – Bradley minus turret

SDVH – Stryker w/Double “V” Hul

AoA Alternatives

AoA Alternatives Considered

Capability		M113 (Base Case)	M2A3-T	MTVL+FP	SDVH	CMTV
Mobility	Thresholds Met	8/9	7/9	8/9	6/9	5/9
	Thresholds Exceeded	2/9	6/9	5/9	5/9	1/9
20% Growth Margin (Power Gen)		1/5	5/5	2/5	1/5	1/5
Total Procurement (BY13)		-	$8.3B	$8.4B	$8.8 – 8.9B	$7.9 – 8.0B
APUC (BY13)		$0.4M	$2.41M	$2.44M	$2.54 – 2.6M	$2.28 – 2.33M
LCCE (BY13)		$15.7B	$25.8B	$24.3B	$24.9 – 26B	$24.0 – 25.1B

- **M113** – APC **M2A3T** – Bradley minus turret
- **CMTV**-Caiman Multi-Terrain Veh **SDVH**- Stryker with Double “V” Hull
- **MTVL+FP**-Mobile Tactical Vehicle Light (Enhanced FP)

Performance Requirements Considerations

	Standoff Detection	Vehicle Protection	Mobility
Lifecycle Cost			
Performance			
Schedule			
Sustainment Impact			
Affordability			

Gap Analysis

Gap 1 : Survivability – Concerned about mine and IED standoff detection and SWAP-C for the unit

The systems mounted on the current vehicles lack the ability to detect, identify and prioritize both ground and aerial targets, at ranges in excess of the threat's detection and weapon systems effective ranges, and inside the threat's detection and response time.

Gap Analysis

Gap 2: Protection – Armored and light vehicle protection against kinetic, chemical and tandem blast warheads

Light tracked vehicles and Tactical Wheeled Vehicles (TWV) have insufficient protection against mines and underbelly IEDs. These Light tracked vehicles and TWVs have insufficient armor to stop EFPs, kinetic projectiles, as well as tandem chemical warheads. There is no "one-size fits all" vehicle that meets all likely threats. Current vehicles lack the capability to protect the occupants from the shock effects of blast

Gap Analysis

Gap 3: Mobility– Road speed, cross country speed, range and urban area maneuver

Current vehicles lack the ability to negotiate the confined spaces presented in urban terrain. Niche force protection vehicles, such as MRAP, lack sufficient cross country and off road mobility. Non-maneuver elements lack the mobility, survivability and connectivity to immediately follow and support combat forces.

Gaps to KPPs (Survivability)

Description	Measures of Effectiveness	Minimum Value	Source/Justification
Detection distance	**Meters – horizontal Meters-vertical**	**xxx**	**Classified Annex**
Power Required for Detection Equipment	**Amps <=**	**XXX**	**Annex**
Detection Accuracy	**Location, distance and verification**	**X% within x meters**	**Classified Annex**

Gaps to KPPs (Force Protection)

Description	Measures of Effectiveness	Minimum Value	Source/Justification
Caliber	**Deflection**	**xxx**	**Annex**
Impact	**Interior Concussion**	**xxx**	**Annex**
Roll-over	**Survivability of crew**	**95%**	**CONOPS**

Gaps to KPPs (Mobility)

Description	Measures of Effectiveness	Minimum Value	Source/Justification
Ascend Grade	**Angle**	**60%**	**CONOPS**
Dash Speed	**Time to mph**	**30 mph Within 22 sec**	**CONOPS**
Vertical Obstacle	**Height**	**24 in**	**CONOPS**
Operational Range	**Miles**	**250 mi**	**CONOPS**

AoA Results

MR	Task	Qty	Force Protection	Mobility	M113A3	M2A3-T	SDVH	CMTV	MTVL+FP
GP	1SG Transport	11	Potentially increase kinetic	Similar to cmbt vehicles		X			X
ME	Medical Evac	30	Potentially increase kinetic	Similar to cmbt vehicles		X			X
MC	Mortar Carrier	14	Keep draft CDD requirements	Similar to cmbt vehicles		X			X
MCmd	BN/BDE TAC BN TOC, FDC	37	Keep draft CDD requirements	Similar to cmbt vehicles		X			X
MCmd	BN CTCP BDE TOC	9	Potentially decrease to small arms and IDF	Potentially decrease to wheeled vehicles in CTCP		X	X	X	X
MT	Medical Treatment	8	Potentially decrease to small arms and IDF	Potentially decrease to wheeled vehicles in CTCP		X	X		X

X: Provides sufficient force protection, mobility, and power generation capabilities.

- Only tracked alternatives provide sufficient mobility to maneuver with combat vehicles across a range of operational environments.
- M2A3-T and MTLV+FP achieve similar levels of force protection through use of add-on armor.
- While SDVH and CMTV excel at under body protection, these vehicles have limited direct fire protection.
- MT and MCmd (CTCP and BDE TOC) vehicles have lower exposure to direct fire threats and primarily travel with wheeled vehicles; opportunity to decrease force protection and mobility requirements.

Cost Estimation Methods

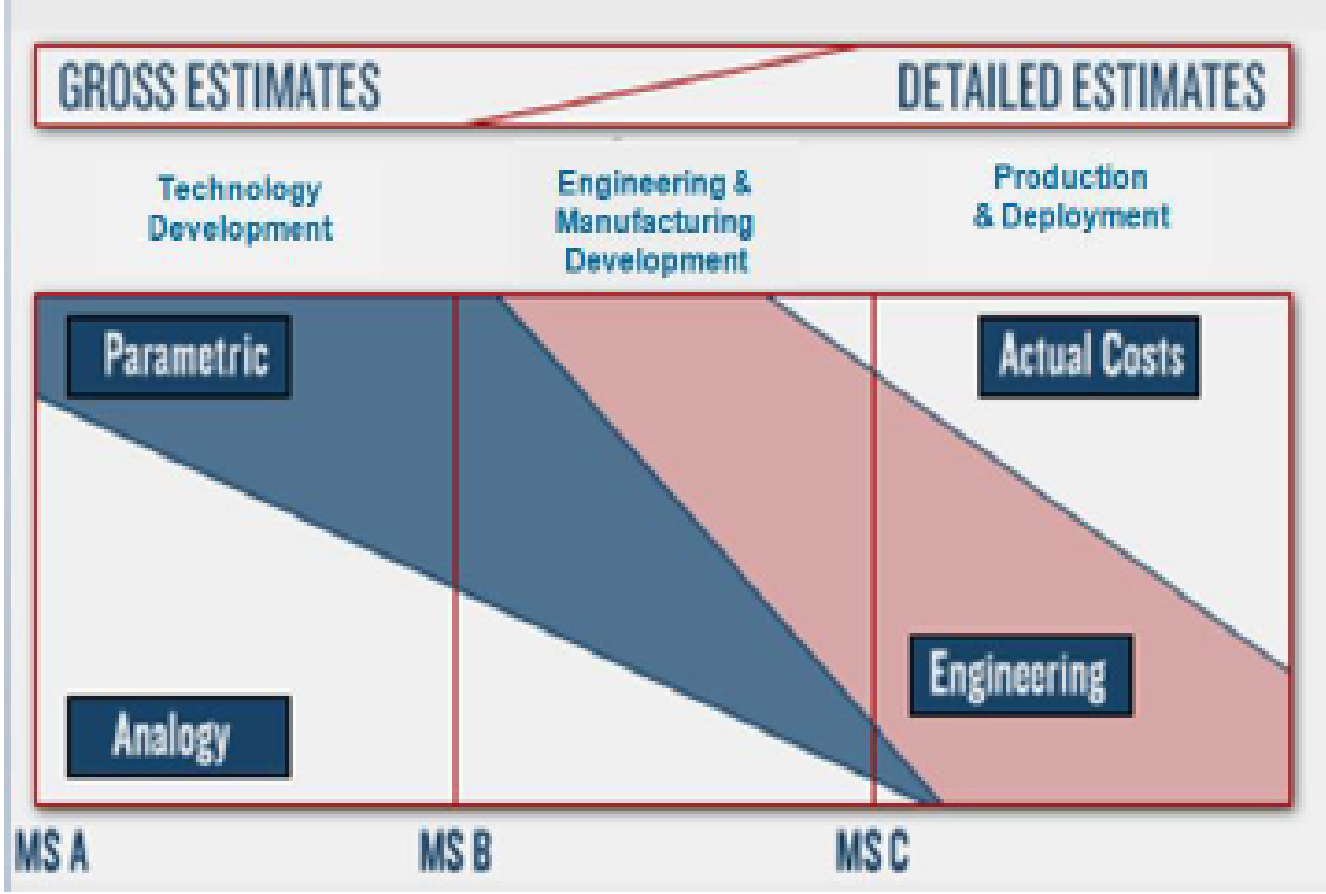
Analogy - Compare the new system with a similar system

Parametric - Statistical analysis of a database of a similar system (Common for software)

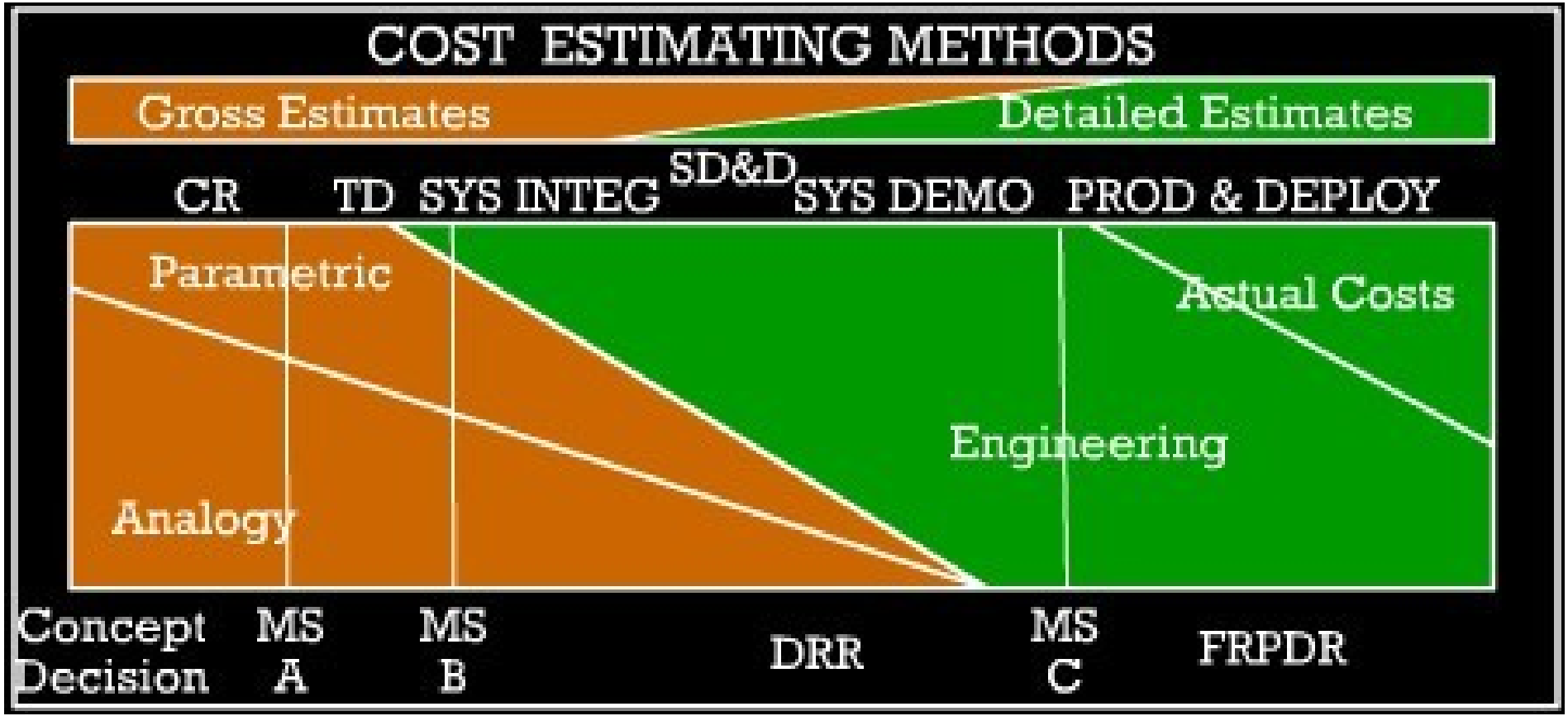
Engineering - “Bottom-up” analysis of all materials, parts and labor

Actual - Extrapolated future estimates from previous nearly identical systems or sub-systems

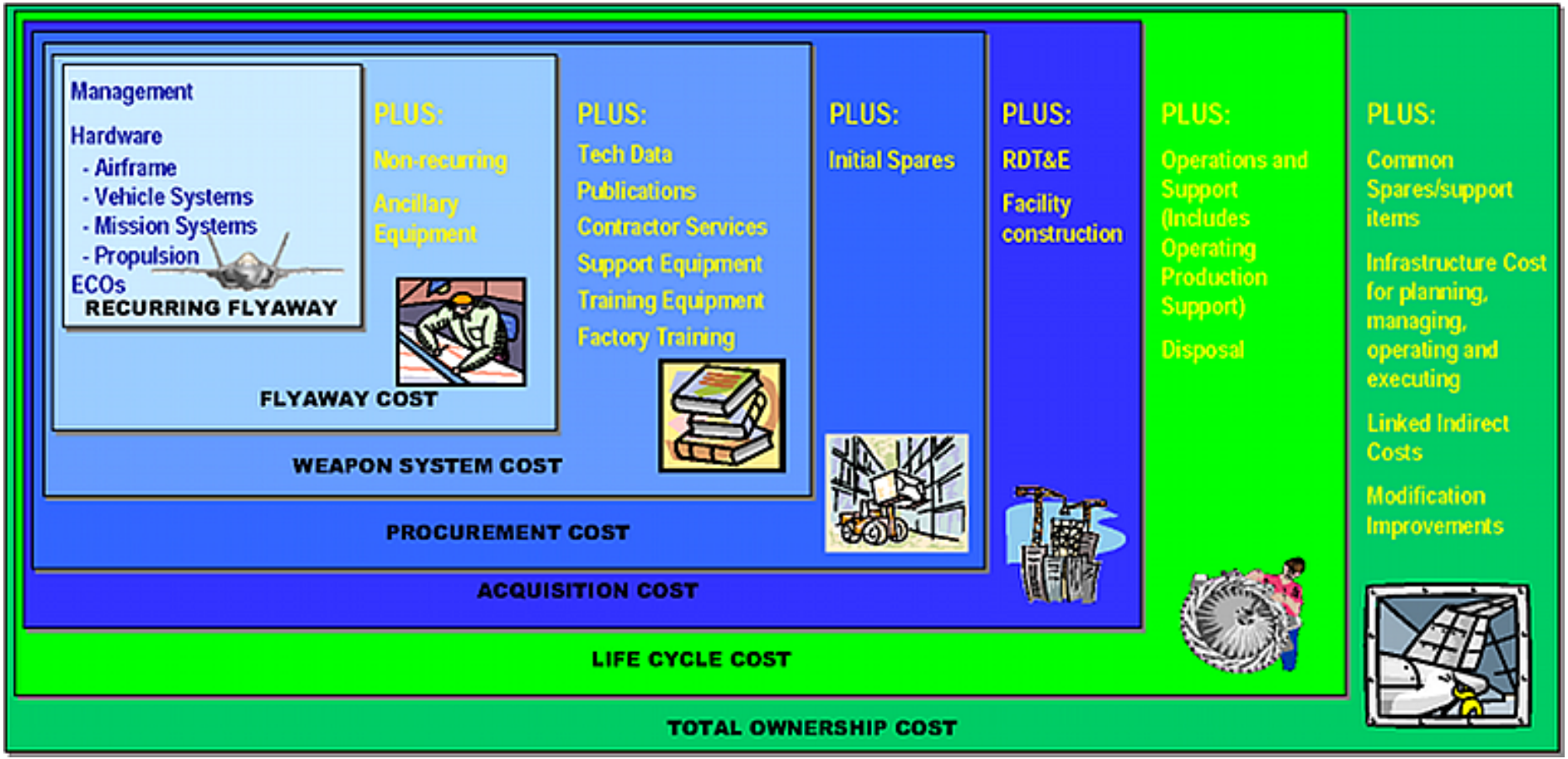
Cost Estimation Methods



Cost Estimation Methods



Types of Costs



Types of Costs (CONT)

Development Cost - RDT&E **(R)**

Flyaway/Rollaway Cost – Procurement **(P)**

Weapon System Cost – Flyaway cost plus support equipment **(P)**

Procurement Cost – Weapon system cost plus initial spares **(P)**

Program Acquisition Cost – All costs including developing, procuring and housing the system **(P)**

Types of Costs (CONT)

Operations and Support Cost – Costs for personnel, equipment, supplies, software, services needed to operate, maintain, supply, train and support a system **(O&M)**

Life-Cycle Cost – Total cost of a program beginning to end. Includes program acquisition cost, operations and support cost and disposal costs. Also called Total Ownership Cost.

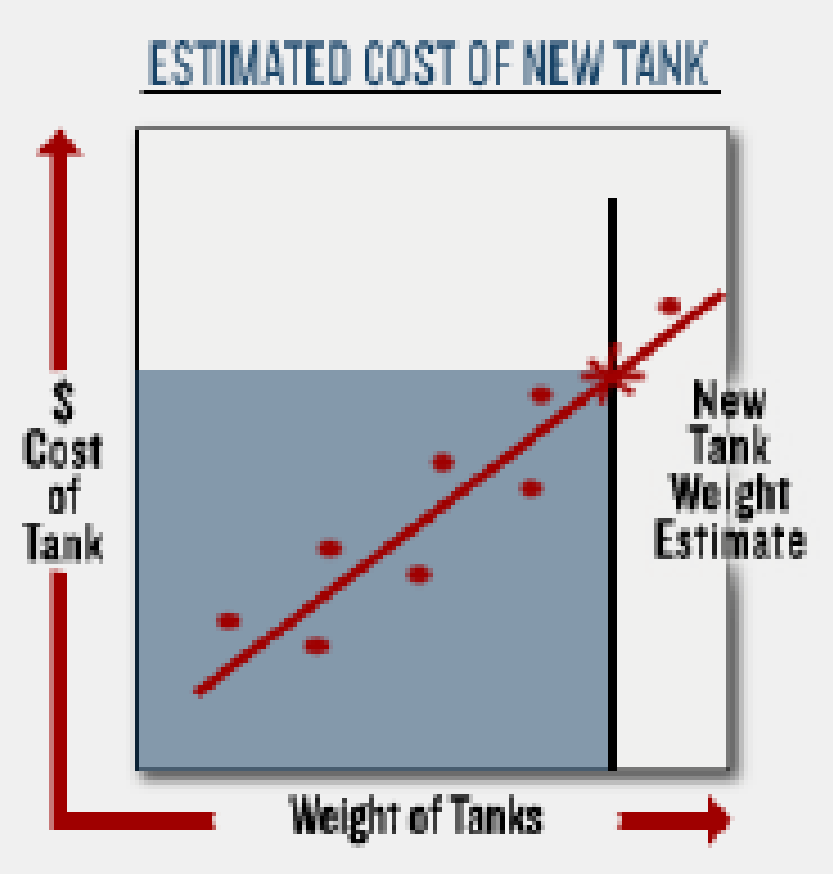
Affordability/Results

The Gap analysis and AoA results showed the M2A3-T met the Force Protection, Mobility and Survivability performance targets at a very high level to affordability and increased sustainment costs. Many AoA cost decisions use **Procurement Unit Cost—**the total Life-Cycle Cost divided by the number of units.

-Multiple Solution for variants?

-Is there a cost to using existing system?

Parametric Example



USAF Specialized Undergraduate Pilot Training

- **SUPT**: 58 Week Program in a minimum of 2 different aircraft.

Initial

- 90 hrs of flight training within 26 weeks
- Students pick follow-on track based on performance

SUPT Tracks

Helo

- For Aircraft:
  - UH-1
  - MH-53
  - HH-60
  - CV-22
- 115 hr / 28 weeks
- Ft Rucker, AL

Airlift/Tanker

- For Aircraft:
  - C-5/C17
  - KC-10/135
  - C-130
  - C-21/U-28
- 90 hr / 28 weeks
- All SUPT bases

Fighter/Bomber

- For Aircraft:
  - F-22
  - A-10
  - F-15/16
  - B-1/2/52
- 100 hr / 27 weeks
- All SUPT bases

SUPT Fighter/Bomber CONOPS

- **Overall concept**: Take students from complete novice status to combat-ready pilots able to employ in both legacy and 5th generation aircraft.

Current

Future

SUPT Advanced Fighter/Bomber

4th Gen Bridge

Legacy Systems

Bridge

5th Gen Bridge

Complex Systems

Combat (FTU)

T-X AoA CAPE Guidance (March 2010)

CAPE Directed the following in their AoA Guidance:

Assumption: USAF IOC: 2017 (Update: 2023) DoN Replacement Need: 2024

- **Feasibility** of developing & fielding replacement aircraft
- **When is it absolutely necessary** to have a replacement for both the USAF and DoN trainer aircrafts?
- Can the T-38C FoS (and F-16 for F-22 bridge) be either **cost effectively maintained/upgraded** to meet ICD requirements?
- Can **existing trainer or other FoS** meet capability requirements?
- What are the **risks** with each APT FoS alternative?
- What are the contributions/impacts of various **levels of maneuverability and propulsion** on cost and effectiveness?
- To what degree are any of the new FoS **suitable for DoN use**?
- What degree of **commonality** can be achieved between USAF and DoN future advanced trainers/training systems?

T-X AoA Results

There were seven alternatives evaluated. Each alternative is a FoS made up of aircraft and Ground Based Training Simulators (GBTS)

- Sustain Current Fleet
- Modernize Current Fleet

Both use the F-16 bridge

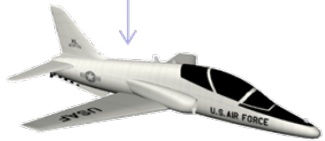
- Use the Navy T-45 Aircraft
- 3 Single Engine Options (1 Subsonic & 2 Supersonic)
  - One Developmental
- 2 Twin Engine Options (1 Subsonic & 1 Supersonic)

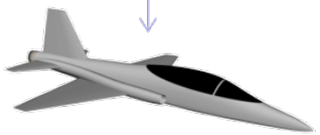
T-X AoA Options

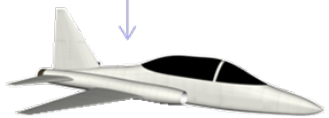
Modify Baseline

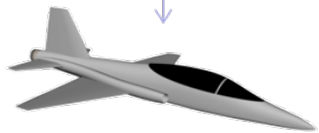
New Alternatives

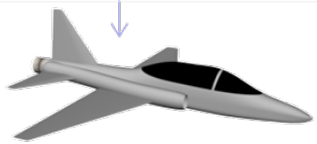
Alt 1 Baseline	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6A	Alt 6B	Alt 7
Sustain	Modernize (Improve)	Naval (T-45)	Single Engine Subsonic	Twin Engine Subsonic	Single Engine Supersonic	Single Engine Supersonic (developmental)	Twin Engine Supersonic (developmental)

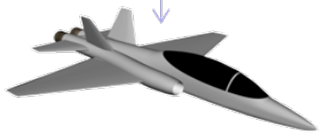








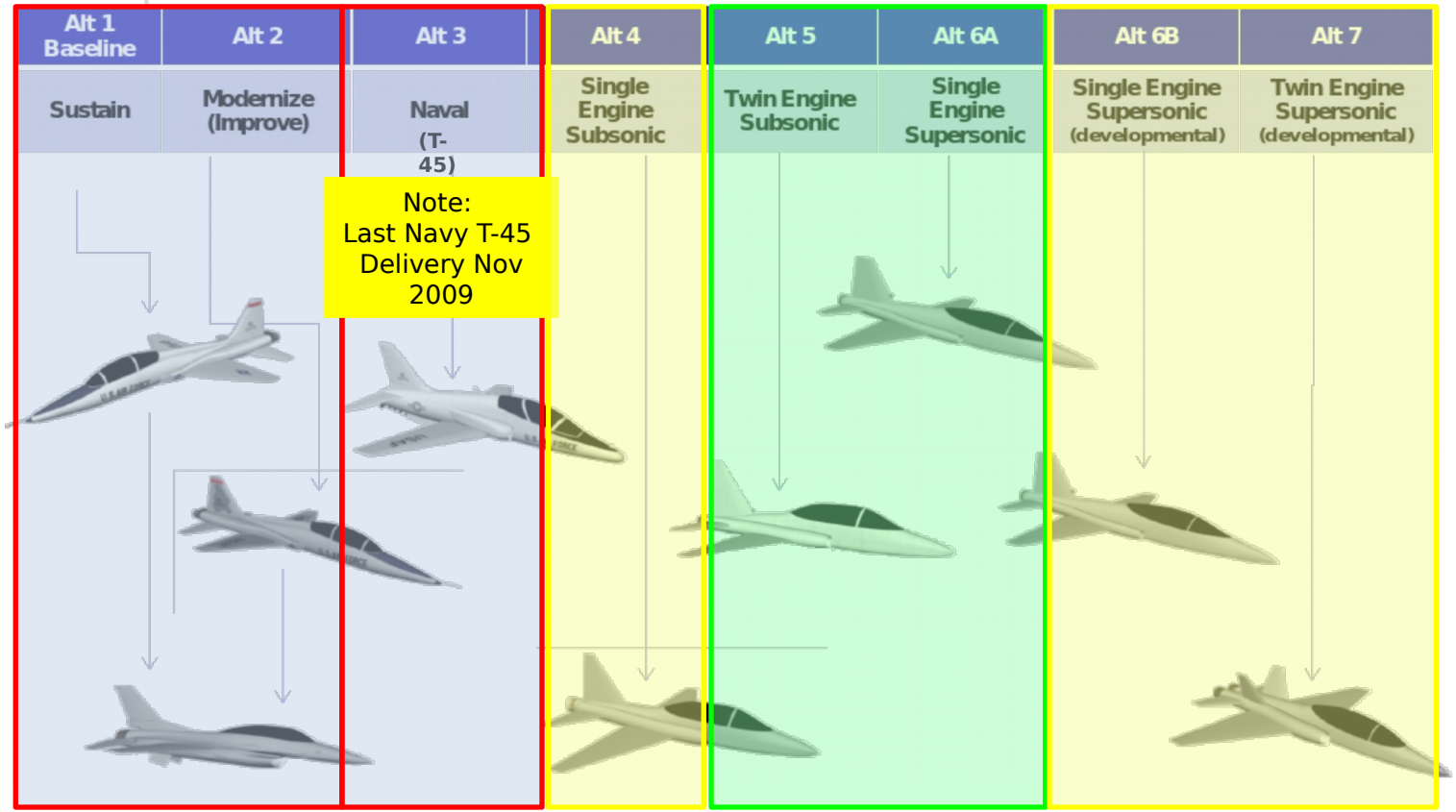




Note:
Sustain
until 2045

T-X AoA Results (1st AoA)

NOTE: IOC 2017
Prototype 201



Not Cost Effective

Not Viable

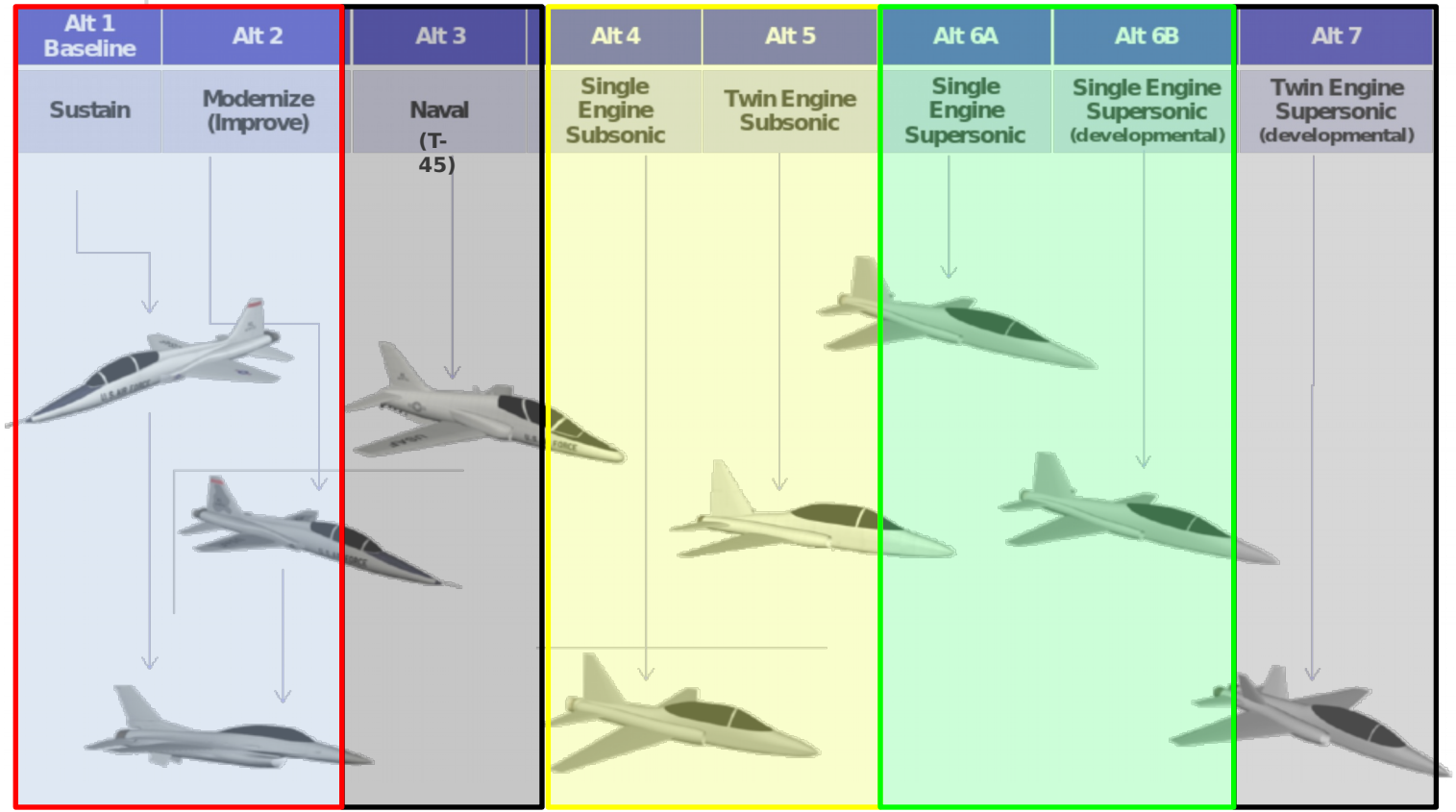
Capability Shortfalls

Most Cost Effective Can Meet IOC

AoA Recommended Non-Development options due to IOC

T-X AoA Results (2nd AoA)

NOTE: IOC 2023
FOC 2031



Includes performance upgrades but still has capability

Not Examined Ruled Out in 1st AoA

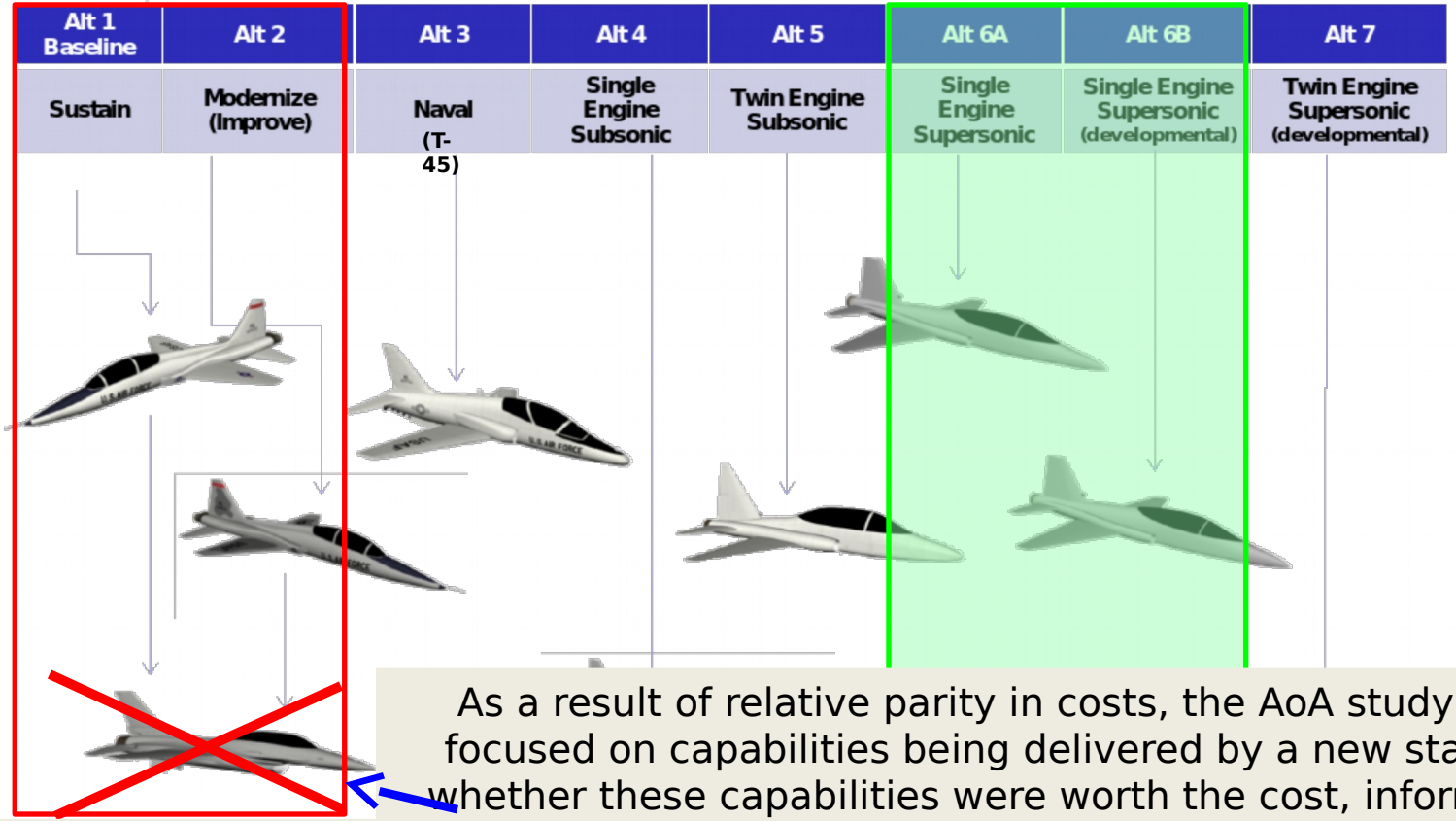
Performance limitations put viability in question

Performance & development timeline now make these acceptable

Vendor Pulled Proposal

T-X AoA Results (2nd AoA)

NOTE: IOC 2023
FOC 2031



As a result of relative parity in costs, the AoA study team focused on capabilities being delivered by a new start and whether these capabilities were worth the cost, informed by

Shortly after the AoA Update concluded, the F-16 Bridge course was eliminated based on ACC and the F-22 FTU assuming the risk created by the T-38C gap.

Based on these factors, the team assessed the new start alternatives significantly increased mission effectiveness while reducing risk to the ATO mission, all at an acceptable level of risk for program success. The team recommended the T-38 Based alternative that will meet an IOC date of 2023.

Video – “Pentagon Wars”

- Subject – **Bradley Fighting Vehicle**
- Timeline – Seventeen Years, at a Cost of $14 Billion
  - Video Shows Series of ‘Flashbacks’ into the Development Process
  - Pictures on Wall(s)
  - Uniforms
- Cast – Main Characters
  - **Lieutenant Colonel Robert L. Smith, Army (1970’s)**
  - **Lieutenant Colonel James Burton, Air Force (Modern Day)**
- Comedy
  - Satirical Representation of Pentagon’s Bureaucracy
  - Some Bad Language
  - Intention is not to Point Fingers at Any Particular Military Service or Make-Fun of GO/FO/SES’s

Pentagon Wars -- Considerations

- During Video, Please Consider the Following:
  - Analysis Conducted on the Original “Armored Personnel Carrier”
  - Cost/Budget Considerations
    - Yesterday’s Priorities vs. Today’s Realities
  - Requirements Creep
    - Senior Leadership Direction
    - Budget Factors

RQM 310
Milestone A to B

Defense Acquisition University

Foundational Learning Workflow Learning Performance Learning

Presenter: Thomas Fritz

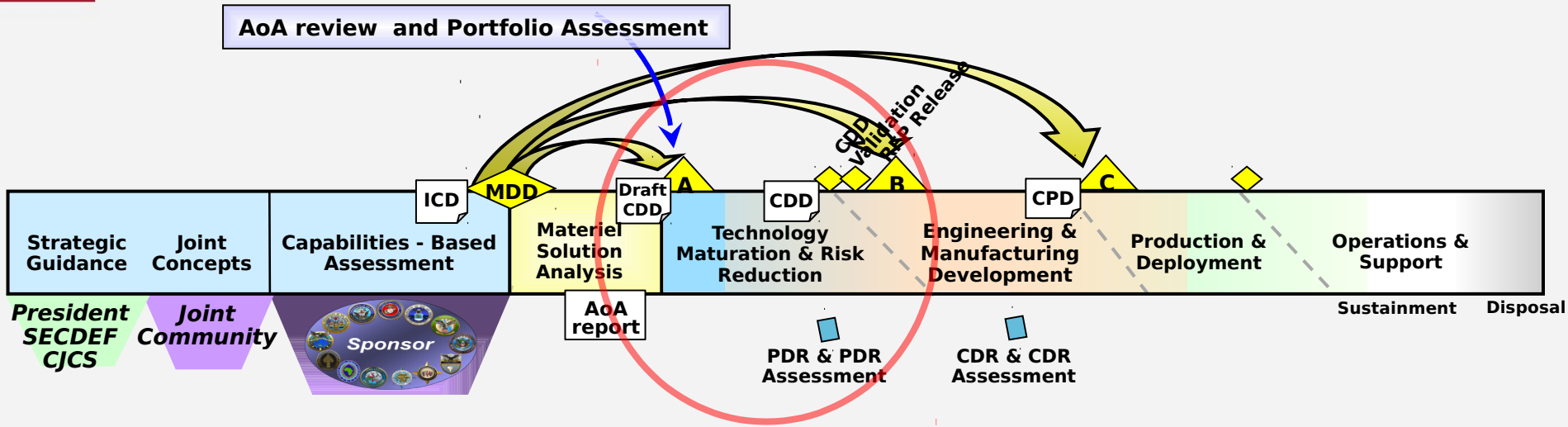
June 9, 2015

Lesson Objectives

Determine the major requirements management activities during the Technology Maturation & Risk Reduction (TMRR) Phase, including the CDD Validation Decision, Development RFP Release Decision, and Milestone B

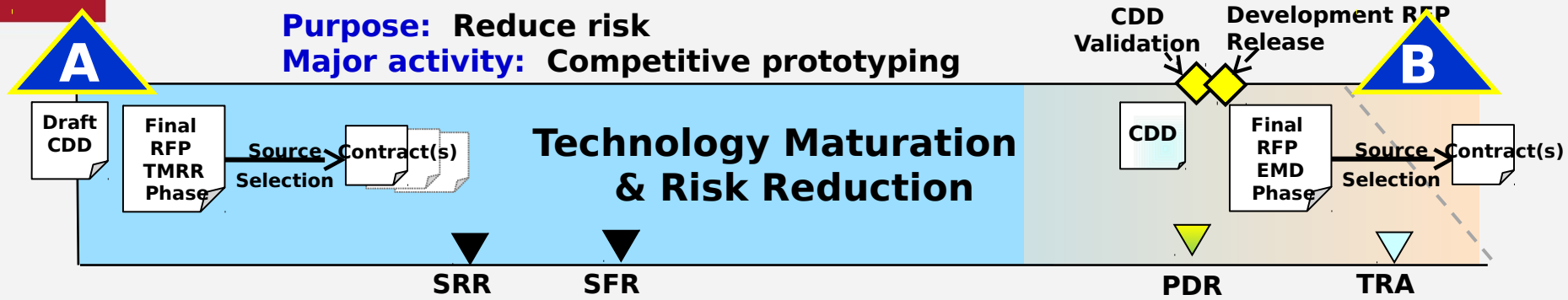
- Explain the purpose and major activities of the TMRR phase and the links between those activities
- Describe the decisions the Milestone Decision Authority (MDA) makes and the items the MDA approves at Milestone B

Milestone A to Milestone B
Technology Maturation & Risk Reduction



Jump

TMRR thru Milestone B
Requirements Management Activities



Requirements Management Activities

- **Participate in**
  - IPTs and technical reviews
  - MDA Reviews: Development RFP Decision Review, MS B
  - Configuration Steering Board (CSB)
- **Monitor/provide input**
  - Acquisition Strategy update
  - PPBE Process
  - TEMP *update*
  - Affordability & Cost Estimate *update*
  - Acquisition Program Baseline (APB)
  - Technology Readiness Assessment (TRA)
  - Life Cycle Sustainment Plan (LCSP) *update*
  - AoA Update, RAM-C report *update*
- **Develop**
  - Revise CDD if necessary, CONOPS/OMS/MP update ; ensure CDD is validated and updates are accomplished before Development RFP

CDD Validation

- Precedes the Development RFP Release Decision and provides a basis for preliminary design activities and the PDR that will occur prior to Milestone B unless waived by the MDA.
- The MDA (and CAE when the MDA is the DAE) participates in the review and staffing of the CDD (or equivalent requirements document), to ensure that requirements are technically achievable, affordable, and testable, and that requirements trades are fully informed by a systems engineering trade-off analyses completed by the PM or DoD Component.

Configuration Steering Board (CSB)

- For ACAT I and IA programs*, after CDD Validation, the CAE forms and chairs a CSB
- Members include senior representatives from the military department, office of the USD(AT&L), the Joint Staff (DJ8), and the DoD CIO
- Program requirements fall under the cognizance of the CSB upon receipt of a validated CDD or other validated requirements document, before the Development RFP Release Decision Point (cognizance described on pg 22 of DODI 5000.02)
- The PM, in consultation with the PEO, will, at least annually, identify and propose to the CSB a set of descoping options that reduce program cost and/or moderate requirements
  - Decisions on descoping options will be coordinated with capability requirements officials

***DoD Components should also form CSBs for lower ACAT programs.**

Preliminary Design Review (PDR)

- Unless waived by the MDA, a PDR will be conducted before Milestone B and prior to contract award for EMD.
- Purpose: Provides the acquisition community, end user, and other stakeholders with an opportunity to understand the trade studies conducted during the preliminary design, and confirm that design decisions are consistent with the user’s performance and schedule needs prior to formal validation of the CDD.
- Outcome: Confirms that the preliminary design satisfies the operational and suitability requirements of the draft CDD.

Development RFP Release Decision (DRFPRD)

- Purpose: Ensure that prior to release of final RFPs for EMD that an executable an AFFORDABLE program has been planned. The Critical decision point in an acquisition program.
- MDA signs ADM that:
  - Approves the Acquisition Strategy
  - Authorizes release of the RFP and source selection for EMD; may include options for LRIP
  - Determines preliminary LRIP quantities for ACAT I & II programs
  - Documents criteria required for MS C (needed testing; affordability; FYDP funding)

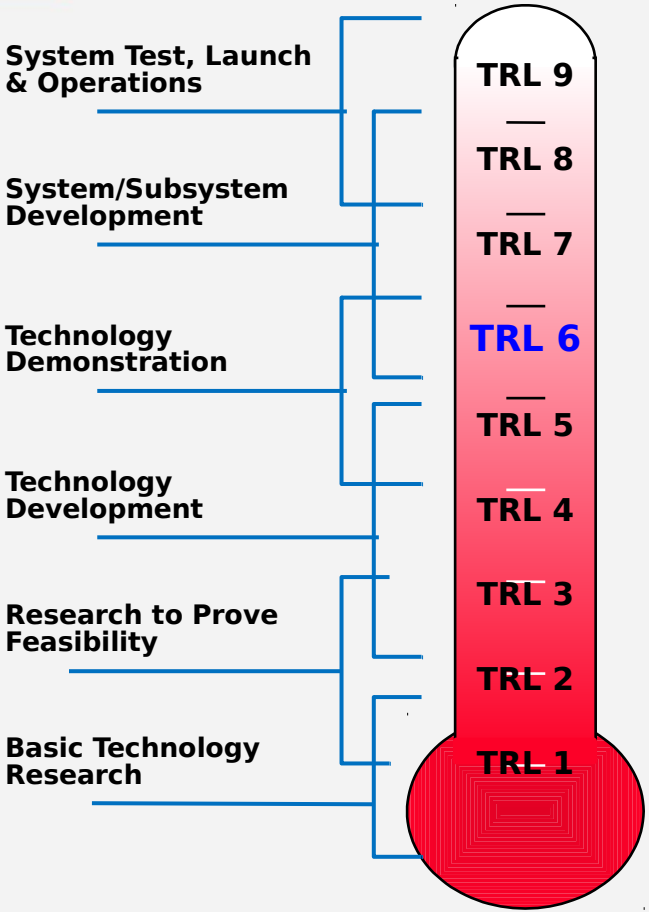
Requires validated CDD (to include ICD elements if ICD waived)

Technology Readiness Assessment (TRA)

- TRA assesses maturity of, and risk associated with Critical technologies to be used in an MDAP
- TRA plan prepared by PM; approved by PEO, CAE and ASD(R&E).
- Conducted by Subject Matter Experts independent of PMO, but assigned by PM.
- Required for MDAPs for Sec. 2366b cert at Milestone B
- TRA results are included in CDD/CPD
- ASD(R&E) provides MDA an independent assessment and review of the TRA final report as to whether technology was demonstrated in relevant environment
- Technology Readiness Levels (TRLs) are knowledge-based standard but not a substitute for professional judgment

Critical technologies are those that may pose major technological risk during development, particularly during the EMD phase of acquisition. (DoD TRA Guidance, April 2011, revised 13 May 2011)

Technology Maturity
Technology Readiness Levels (TRLs)



Actual system proven through successful mission operations

Actual system completed and qualified through test and demonstration *(Full-Rate Production Decision)*

System prototype demonstration in a operational environment *(Milestone C)*

System/subsystem model or prototype demonstration in a "relevant environment" *(2366b certification item - Milestone B)*

Component and/or breadboard validation in relevant environment

Component and/or breadboard validation in laboratory environment

Analytical and experimental critical function and/or characteristic proof-of-concept

Technology concept and/or application formulated

Basic principles observed and reported

Public law requires MDAPs be at TRL 6 for Milestone B

Milestone B

- **Formal Program Initiation (most programs) with approval of the Acquisition Program Baseline (APB)**
- **Authorizes entry into EMD phase and award of contracts for EMD**
  - Most Milestone B documentation requirements will have been satisfied at the Development RFP Decision (DRFPRD)
  - Any significant changes since DRFPRD must be provided
- **Commits required investment resources to program**
- **MDA finalizes, if not already completed at DRFPRD:**
  - LRIP Quantity or limited fielding scope
  - Exit criteria for leaving EMD and entering next phase
- **MDA approves:**
  - APB (includes affordability caps)
  - 2366b Certification
  - ADM to document decisions

• Requires validated CDD (to include ICD elements if ICD waived), and
• Full Funding in the Future Years Defense Program (FYDP)

ACAT I Section 2366b Certification

RM interest areas are in blue bold

MEMORANDUM FOR THE RECORD

SUBJECT: Milestone B Program Certification

As required by Section 2366b of Title 10, United States Code,

(1) I have received a business case analysis for the (name of program) and certify on the basis of the analysis that:

(A) **the program is affordable** when considering the ability of the DOD to accomplish the program's mission using alternative systems;

(B) **appropriate trade-offs among cost, schedule, and performance objectives have been made** to ensure that the program is affordable when considering the per unit cost and the total acquisition cost in the context of the total resources available during the period covered by the future-years defense program submitted during the fiscal year in which the certification is made;

(C) **reasonable cost and schedule estimates have been developed to execute, with the concurrence of the Director of Cost Assessment and Program Evaluation, the product development and production plan under the program;** and

(D) **funding is available to execute the product development and production plan under the program, through the period covered by the future-years defense program** submitted during the fiscal year in which the certification is made, consistent with the estimates described in paragraph (C) for the program;

(2) **I have received the results of the preliminary design review and conducted a formal post-preliminary design review assessment, and certify on the basis of such assessment that the program demonstrates a high likelihood of accomplishing its intended mission**;

2366b Certification continued..

RM interest areas are in blue bold

(3) I further certify that:

(A**) appropriate market research has been conducted** prior to technology development to reduce duplication of existing technology and products;

(B) the **DOD has completed an analysis of alternatives** with respect to the program;

(C) the **JROC has accomplished its duties with respect to the program pursuant to section 181(b) of Title 10, including an analysis of the operational requirements for the program;**

(D) **the technology in the program has been demonstrated in a relevant environment,** as determined by the MDA on the basis of an independent review and assessment by the ASD for Research and Engineering in consultation with the DASD for Development Test and Evaluation**;**

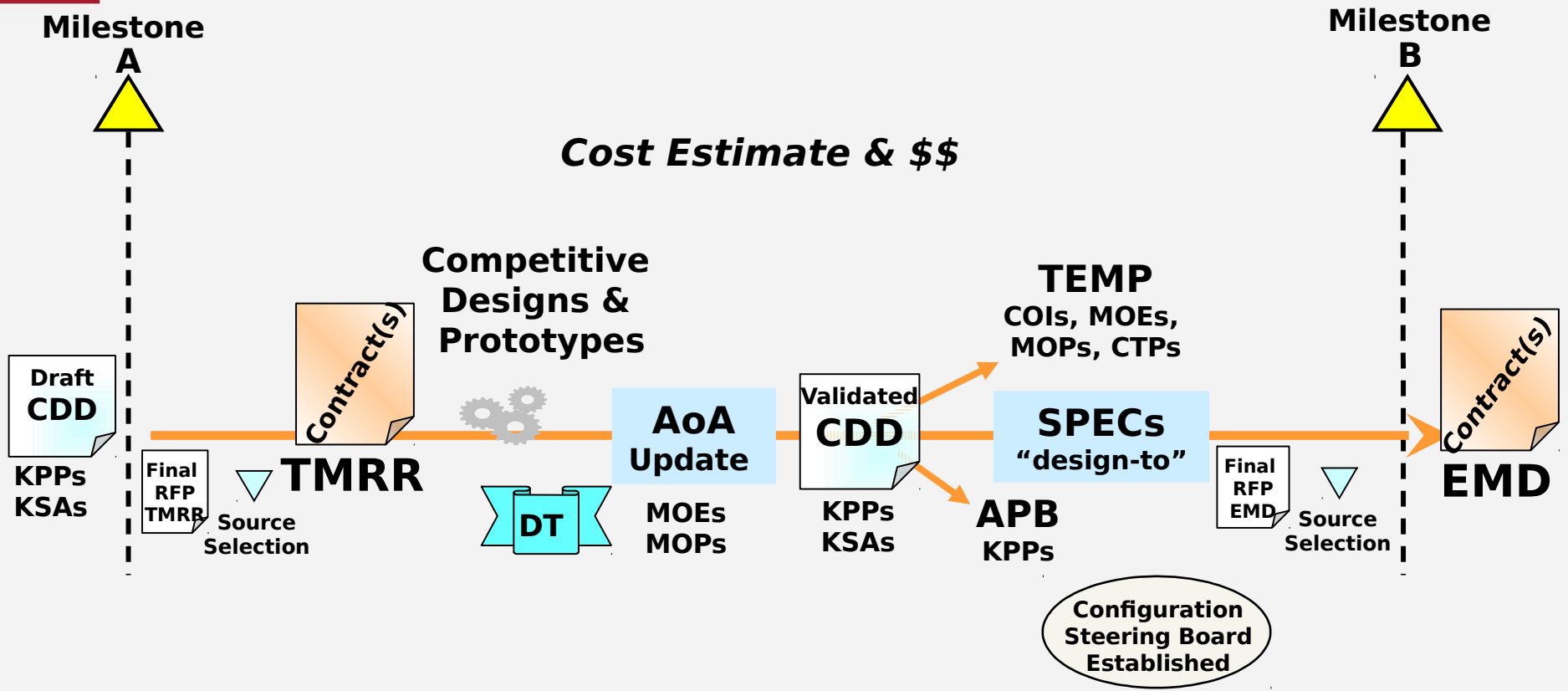
*(E) **life-cycle sustainment planning, including corrosion prevention and mitigation planning, has identified and evaluated relevant sustainment costs throughout development, production, operation, sustainment, and disposal of the program, and any alternatives, and that such costs are reasonable and have been accurately estimated**;*

*(F) **an estimate has been made of the requirements for core logistics capabilities and the associated sustaining workloads required to support such requirements**;*

*(G) **there is a plan to mitigate and account for any costs in connection with any anticipated de-certification of cryptographic systems and components during the production and procurement of the major defense acquisition program to be acquired**; and*

(G) the program complies with all relevant policies, regulations, and directives of the DoD.

Linkage: CDD, APB, TEMP & Contracts for TMRR and EMD



Technology Maturation & Risk Reduction Phase

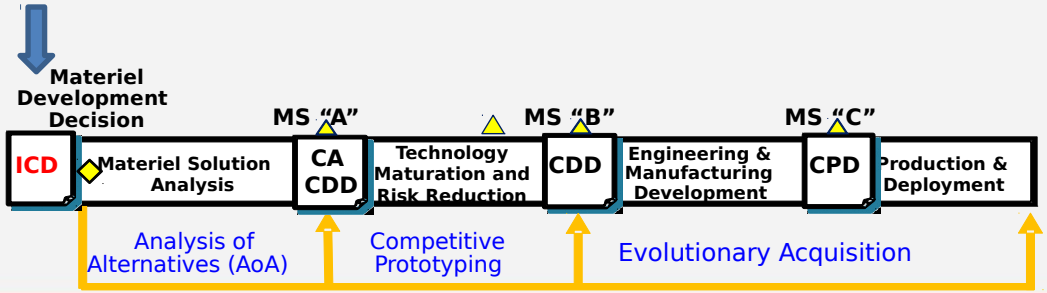
BACK-UP

Resources

Thomas Fritz	thomas.fritz@dau.mil	
JCIDS	CAC enabled https://intellipedia.intelink.gov/wiki/JCIDS	
DoD 5000.02	http://www.dtic.mil/whs/directives/corres/pdf/500002p.pdf	
Generic Acquisition Process (Pre-Tailoring) Acquisition Decision Points and Phases	Acquisition Waterfall Chart with color enhancements 17 Dec final (3).pdf	
Technical Reviews for Requirements Managers	https://BlackBoard Link Tech Reviews	
	Jump Back	

JCIDS Document Flow

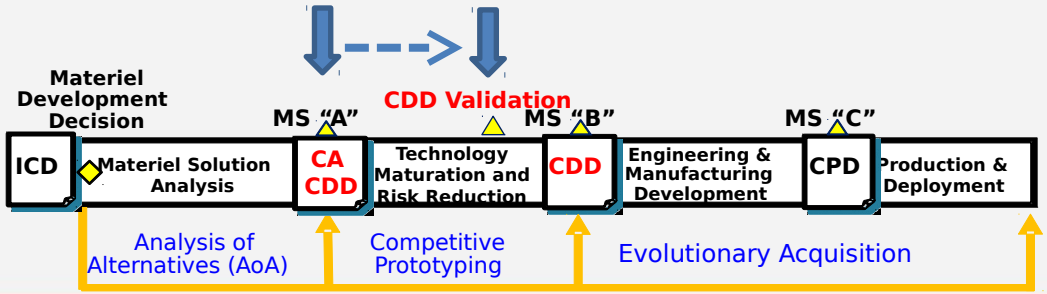
- Initial Capabilities Document (ICD)
  - **Identifies capability gaps with recommendations for material solutions**
  - **Information for an Analysis of Alternatives (AOA) of possible material solutions**
  - **Sets the acquisition stage**
  - **Only 10 pages max…**



JCIDS Document Flow

Capability Development Document (CDD)

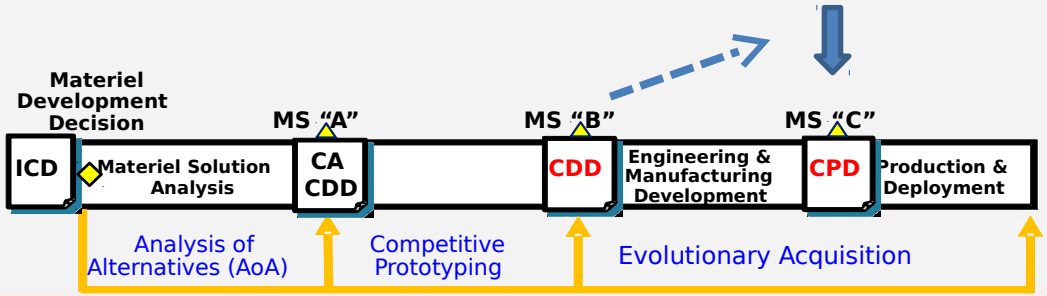
- Draft *(Component-Approved)* CDD at or before MS A
  - Informs TMRR contracts
- *Validated* CDD for Requirements Decision Point prior to MS B
- Identifies KPPs, KSAs, & APAs
  - Attributes should be Authoritative, Measureable, & Testable
- Describes DOTmLPF-P constraints associated with the solution
- Could describe multiple increments
- Supports AS & APB
  - Insert all CDD KPPs and Sustainment KSAs verbatim into the APB
- 45 page limit…



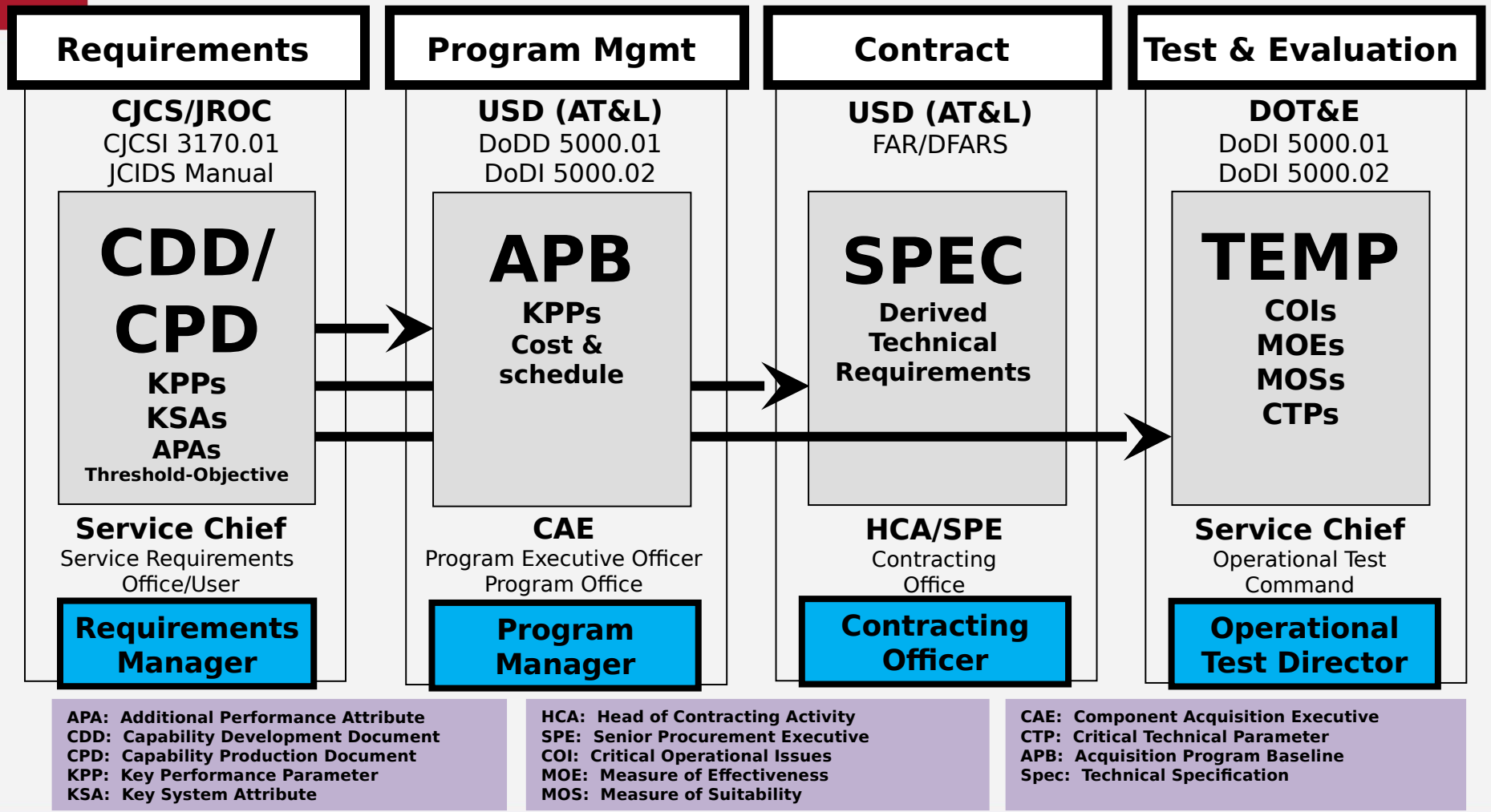
JCIDS Document Flow

Capability Production Document (CPD)

- Supports *one* increment
  - Production, Development Testing, and Deployment
- Documents authoritative & testable capabilities
- No new requirements!
- Must meet operational performance attributes
- 40 page limit…



Requirements/Acquisition Document Traceability



www.DAU.mil

RQM 310

Developing Requirements KPPs and Performance Attributes

Defense Acquisition University

Foundational Learning

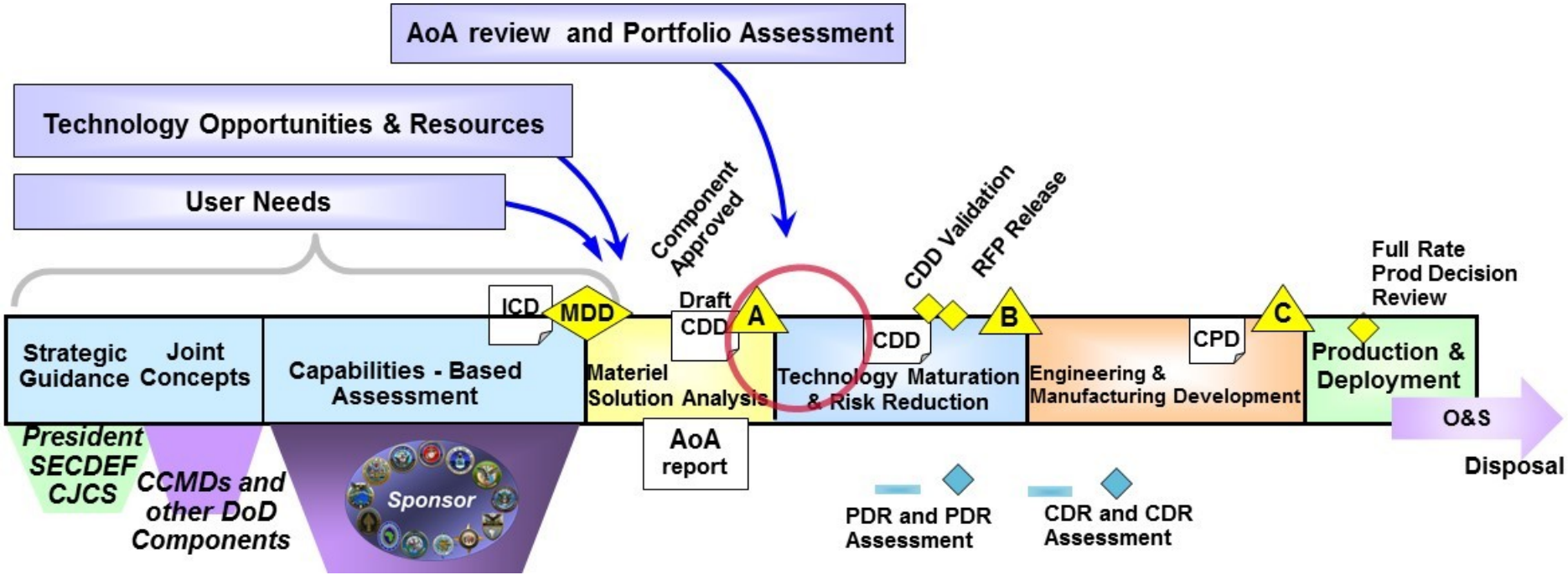
Workflow Learning

Performance Learning

Lesson Objectives

- Demonstrate the proper format of performance attributes and KPPs:
  - **Identify Mandatory KPPs**
  - **Identify the characteristics of well and poorly written KPPs**
  - **Critique KPPs for clarity, achievability and resourcing**
  - **Explain the relationships of the KPPs and KSAs to Measures Effectiveness (MOEs), Measures of Performance (MOPs), and Measures of Suitability (MOSs)**
  - **Identify solutions to requirements creep**

KPP and KSA Development



DoD Definitions

- **Requirement (Capability Requirement)—**
  - A capability which is required to meet an organization's roles, functions, and missions in current or future operations. Note: a requirement is considered 'draft' or 'proposed' until validated by the appropriate authority.

- **Capability—**
  - The ability to execute a specific course of action.

- **Capability Gap—**
  - The inability to execute a specified course of action.

DoD Definitions and Explanations

Requirement

- A capability which is required to meet an organization's roles functions, and missions in current or future operations. Note: a requirement is considered 'draft' or 'proposed' until validated by the appropriate authority.

Capability

- The ability to execute a specific course of action.

Capability Gap

- The inability to execute a specified course of action.

Example: USAF Tanker Fuel Load & Passenger Capabilities

KC-XX
Fuel Load: DoD Defined KPP
Passengers: DoD Defined KPP

KC-135
Fuel Load: 200,000 lbs.
Passengers: 35

(Currently)

KC-46
Fuel Load: 212,672 lbs.
Passengers: 114

Key Performance Parameter (KPP) Definition

Key Performance Parameters (KPP) – Performance attributes of a system considered critical to the development of an effective military capability. The number of KPPs identified by a Sponsor should be kept to a minimum to maintain program flexibility.

KPPs must be **measurable, testable and quantifiable**. Failure of a system to meet a validated KPP threshold/initial minimum **rescinds** the validation, brings the military utility of the associated system into question and may result in a reevaluation of the program or modification to

JCIDS Definitions of Threshold vs Objective

Threshold — A minimum acceptable value considered achievable within the available cost, schedule, and technology at low-to-moderate risk. Performance below the threshold value is not operationally effective or suitable or may not provide an improvement over current capabilities.

Objective— Is the desired operational goal achievable but at higher risk in cost, schedule and technology. Performance above the objective does not justify additional expense.

The difference between Threshold and Objective = "Trade Space"

Key System Attribute (KSA) Definition

Key System Attribute (KSA) – attributes or characteristics considered essential to achieving a balanced solution / approach to a system, but not critical enough to be designated a KPP. KSAs must be **measurable, testable and quantifiable.**

Types and Attributes of Requirements

Types of Requirements

- **Customer/Operational**
- **Functional**
- **Performance**
- **Design**
- **Derived**
  - **Long Range, High Spd**
    - **Light**
- **Allocated**
  - **100lbs Item**
    - **70lbs**
    - **30lbs**

Requirement should be

- **Achievable**
- **Measurable/Testable/Quantifiable**
- **Unambiguous**
- **Complete**
- **Necessary**
- **Prioritized**

Key Performance Parameters (KPPs) and Key System Attributes (KSAs)

- Force Protection KPP (all manned systems)
- System Survivability KPP (all manned; may be applicable to unmanned)
- Sustainment KPP (all ACAT I*)

  Materiel Availability

  Operational Availability

  Supporting KSAs

  Materiel Reliability

  Operation & Support Costs
- Net Ready KPP (all IS & NSS)
- Training KPP (all ACAT I)
- Energy KPP (all where provisions of energy impact operational reach, or protection of energy infrastructure or energy resources is required)

Page: D-A-2 to D-A-4
JCIDS Manual

Mandatory where applicable

*ACAT II and below programs, must include the Sustainment KPP or Sponsor defined sustainment metrics.

Key Performance Parameters (KPPs)

Intended to ensure protection of occupants, users, or other personnel (other than the adversary) who may be adversely affected by the system or threats to the system. …. Addresses protection of the system operator or other personnel against kinetic and non-kinetic fires, CBRN, and environmental effects, rather then protection of the system itself and its capabilities.

Force Protection KPP

Key Performance Parameters (KPPs)

…Intended to ensure the system maintains its critical capabilities under applicable threat environments. …may include reducing a system's likelihood of being engaged by hostile fire, through attributes such as speed, maneuverability, detectability, and countermeasures; reducing the systems vulnerability if hit by hostile fire, through attributes such as armor, redundancy, enabling operation in degraded EM, space, or cyber environments…

ystem Survivability KPP

Key Performance Parameters (KPPs)

Intended to ensure an adequate quantity of the capability solution will be ready for tasking to support operational missions. The supporting Reliability KSA and O&S Cost KSA, ensure that the Sustainment KPP is achievable and affordable in its operational environment.

Note: Cost Assessment and Program Evaluation (CAPE) will be significantly involved with all cost analysis ie. fully burdened cost of energy.

$ustainment KPP

Key Performance Parameters (KPPs)

Intended to ensure combat capability of the force by balancing the xxxxx performance of systems and the provisioning of xxxxx to sustain systems/forces required by the operational commander under applicable threat environments.

Energy KPP

Key Performance Parameters (KPPs)

Intended to ensure new and modified IS fits into DOD architectures and infrastructure to the maximum extent practicable.

Net Ready KPP

To mitigate the risk of delivering non-interoperable capabilities to the Warfighter

Intended to ensure that materiel aspects of training capabilities, when applicable, are addressed as part of the development of the capability solution outlined in the CDD or CPD. Non-materiel aspects of training are to be captured as part of the DOTmLPF-P section of the CDD or CPD.

Training KPP

KPP Relief

Requesting KPP Relief **JCIDS Man D-A-11**

To fulfill the JROC's Title 10 responsibilities for tradeoffs between cost, schedule, and Performance when validating military requirements, the JROC encourages the requirements Sponsor, in coordination with the MDA, to request requirements relief from the validation authority when cost-benefit analyses indicate previously validated KPPs may drive costs out of proportion with the capability delivered to the operational user.

KPP Relief

Changing context over time

While the KPPs (and KSAs and APAs) documented and validated in capability requirement documents represent the validation authority's best military advice at an instant in time, knowledge gained through acquisition activities, changes to strategic guidance, external threats, mission requirements, or budgetary realities may make relief from previously validated KPPs appropriate.

KPP Relief

Budgetary considerations

While there are no limitations for requesting requirements relief, KPP relief should be considered especially appropriate in cases where significant cost savings may be achieved with marginal impact to operational capability. i.e. – spending 15 percent of a program's budget to get
the last 3 percent of a KPP threshold, if the operational risk involved with a reduced threshold is minimal.

Navy's New "Key Parameter" Changes

- **Navy's New "Key Parameters" (effective 11 Aug 14)**
  - **Navy adding two new key parameters:**
    - **Key Cost Parameter**
    - **Key Schedule Parameter**
  - **Navy's goal is to place cost and schedule on par with performance and encourage better trades between cost, schedule, and performance to remain within fiscal constraints**
- **Navy is also adding another KPP – SWaP-C**
  - Navy's goal for a "Space, Weight, Power, and Cooling" KPP is to ensure programs have sufficient and clearly defined design margins at the outset

Navy's New "Key Parameter" Changes

CONT

- **N8 Capability Review "Tripwire"**
  - **If "actual or projected" cost or schedule parameters, as captured in the JCIDS docs, is exceeded, N8 will convene either an NCB or R3B**
  - **Trades will be considered among cost, schedule and performance to get program back in line**
- **Cost and Schedule will also have corresponding KSA-like attributes**
  - **Key Cost Attributes**
  - **Key Schedule Attributes**
- **Operational test authorities will not test to the new KCPs or KSPs (nor their key attributes)**

Navy's "Key Parameter" Implementation

- **Set KCP "unit cost" at least 5% below threshold value**
  - **JCIDS docs must explain what a "unit" is for the program and how KCP was derived**
- **KSP will use IOC date as threshold and IOC minus 6 months for objective**
- **New Navy ICDs will now have "not-to-exceed" cost cap and IOC need date captured in doc**
  - **Resource sponsor must consider the amount of funding projected to be available for the program**
- **SWaP-C will only be considered for Navy "platforms" (ships, aircraft, UAVs, etc)**

AoA Results

- Littoral Combat Ship (LCS) KPPs :
  - Mission Package Payload
  - Sprint Speed
  - Endurance Range
  - Core Ship Crew Size
  - Draft

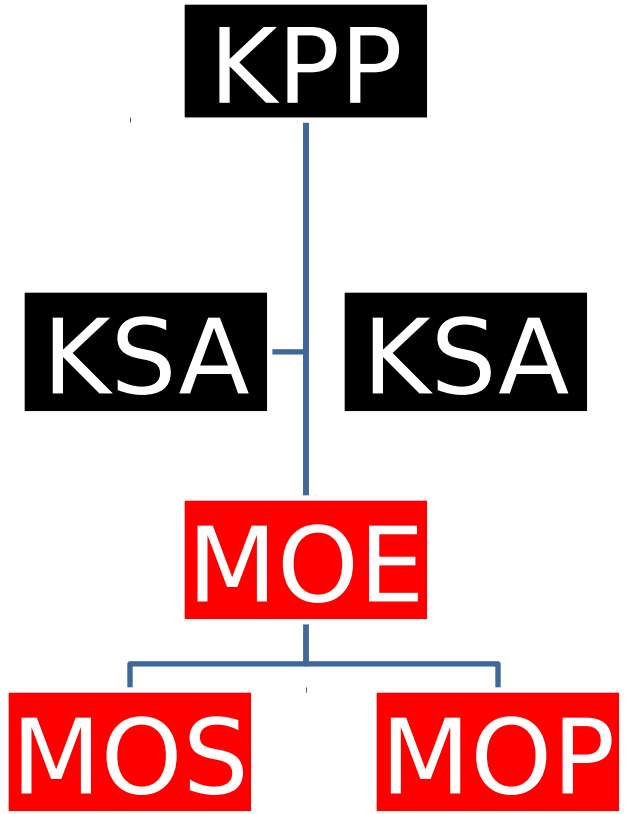
Congressional Research Service – LCS Tradeoffs

- In Web Browser:
  - www.google.com
  - Type: Congressional Research Service **Navy Littoral Combat Ship (LCS) Program**
  - Click on: [PDF] Navy Littoral Combat Ship (LCS) Program – Federation of American …

Cost Estimation Methods

Measure of Effectiveness (MOE)

Measure designed to correspond to accomplishment of mission objectives and achievement of desired results. MOEs can be assessed using two subsets; Measures of Performance (MOP) and Measures of Suitability (MOS)



Measures of Performance (MOP) and Suitability (MOS) – JSF Example

- **MOP** – Quantifiable Performance Attributes ie. Speed, Payload
- **MOS** – Item's Ability to be Supported in Intended Op. Environ.

Table B-1 summarizes key performance parameters for the three versions of the F-35.

Table B-1. F-35 Key Performance Parameters (KPPs)

Source of KPP	KPP	F-35A Air Force CTOL version	F-35B Marine Corps STOVL version	F-35C Navy carrier-suitable version
Joint	Radio frequency signature	Very low observable	Very low observable	Very low observable
	Combat radius	590 nm Air Force mission profile	450 nm Marine Corps mission profile	600 nm Navy mission profile
	Sortie generation	3 surge / 2 sustained	4 surge / 3 sustained	3 surge / 2 sustained
	Logistics footprint	< 8 C-17 equivalent loads (24 PAA)	< 8 C-17 equivalent loads (20 PAA)	< 46,000 cubic feet, 243 short tons
	Mission reliability	93%	95%	95%
	Interoperability	Meet 100% of critical, top-level information exchange requirements; secure voice and data		

Question: Are the JSF G-Limits Below MOPs or MOSs?

USAF 9.0g **USMC 7.0g** **USN 7.5g**

GAO Report *(Recent)* – Configuration Steering Boards

- In Web Browser:
  - www.google.com
  - Type: GAO-14-466R
  - Click on: [PDF] GAO-14-466R, Defense Acquisitions: Military Services …

Configuration Steering Boards (CSBs)

The Acquisition Executive of each DoD Component shall establish and chair a CSB with broad executive membership . . .

DoDI 5000.02 per Section 814, FY '09 National Defense Authorization Act

- **CSBs meet at least annually**
  - **Reviews all requirements changes and significant technical configuration changes**
  - **Changes generally rejected, deferred to future blocks or increments**
  - **If approved, changes require identified funding and mitigated schedule impacts**
- **The Program Manager (PM) (with the Program Executive Officer) identifies descoping options to reduce program cost or moderate requirements**
- **The CSB recommends which options should be implemented**
- **Final decisions coordinated with the Joint Staff and military department requirements officials**

Requirements Creep

- Creep is/are:
  - New Requirements Being Levied on a Program
  - Discovered during testing and development
  - Budgetary Matters/Issues Creeping into Program's Overall Cost; Thereby Causing KPP Re-Evaluation (For Cost)

- Is Requirements Creep, In One Form or Another, Inevitable?

NOTE: Only the JROC can initially validate and/or revalidate KPPs

Remedies to Requirements Creep

- Regular dialogue between RM and PM
- Well-Written Requirements
- Process Discipline
- Configuration Steering Boards (CSB)

Lesson Review

- The Requirements Managers represent the warfighters' interests in the Acquisition process.
- The RMs' major purpose in the JCIDS and Acquisition process is to prevent unnecessary requirement changes (creep) and minimize negative influences (delays, cost increases) on their program.
- Failure will result in delay and increased costs and may result in overall failure to complete the acquisition successfully…thereby failing the

Lesson Review

- Requirements Managers and Acquisition Professionals must both remain aware of the requirements to gain approval for every change to any KPP.

- They both have a duty to inform the other, as well as their leadership, of changes (required or proposed) and establish a timeline to gain approval for these changes (may include a requirement to send an impact statement to decision making bodies in the chain of command).

Back-Ups

Recent Examples of Evaluation of Performance Parameters

- **Joint Strike Fighter**
  - During the recent requirements review, JROC avoided additional cost growth by de-scoping the requirements for combat radius, short take-off distance, and maximum carrier approach speed.
  - JROC provided input for the dual path helmet development to the MDA.

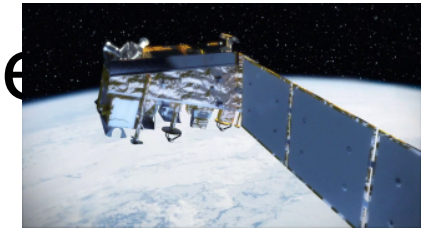
NOTE: To provide timely KPP relief (per VCJCS direction), the JROC receives an annual requirements review to evaluate program cost versus capability.

Recent Examples of Evaluation of Performance Parameters

- **UCLASS**
  - JROC re-examined operational concept for employment.
  - JROC reviewed the ICD and revised requirements to provide maximum capability and capacity within the program funding baseline. Specifically,
    - Increased the requirements for UCLASS' payload versatility.
    - Increased the number of units procured while reducing survivability requirements.

- (JROCM 176-12) JAGM: Joint Air-Ground Missile
  - Affected interoperability with platforms and other KPPs in a three step process...increments 1, 2, and 3 thresholds and objectives.
  - Addressing which aircraft were capable. Adjusting threshold

Program and KPP Example



Weather Satellite System

Mission: to collect and disseminate other critical air, land, sea, and space environment data to support a broad range of national security users.

- KPPs Include:
  - **Ocean Color**: accuracy and precision for ocean color, with values of 0.1 W m-2 µm-1 sr-1 or 10% (whichever is greater) and 0.05 W m-2 µm-1 sr-1 or 5% (whichever is greater), respectively
  - **Sensing depth:** must be at least 0.2 cm (into the soil) based on a horizontal cell size (HCS) of 40 km
  - **Sea Surface Wind Speed:** measurement accuracy which is required to be less than the “greater of 3 m/s or 15%” (of the measured value)

Program and KPP Examples

- Medium Armored Vehicle (MAV) Mission: to provide a family of vehicles (FOV) that were air transportable anywhere in the world and support infantry operations

Source: Equipment Sustainment Requirements for the Transforming Army, RAND, 2009

Program and KPP Examples

- Medium Armored Vehicle Resulted with Four KPPs Definition:
  - Interoperability – All Services
  - Transportability – C-130
  - Carry an Infantry Squad
    - USMC vs. USA
  - Destroy a standard infantry bunke

urce: Equipment Sustainment Requirements for the Transforming Army, RAND, 2009

Requirements Creep

- Requirements creep refers to significant additions or modifications to the requirements of a new system throughout the lifecycle, resulting in extensions to and alteration of the system's functionality and scope

KPP Development

- Guidelines for Writing Quality KPPs
- Questions to ask before a performance attribute is selected as a KPP
  - If an item does not meet the KPP definition, consider it for inclusion as a Key System Attribute (those issues that do not rise to the level of a Key Performance Parameter)
  - Key Performance Parameter (KPP) Steps